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Telephone Construction Practice

H. J. MINHINNICK

PRELIMINARY.

WHEN the franchise for the proposed plant has been secured and the company organized and financed, the first matter demanding attention is the composition of the working forces. The work of building the exchange falls naturally into two divisions—office and field—and, to secure the best results, these branches should be kept strictly separate. In the board of directors lies the supreme authority in all matters connected with the company, and they constitute the court of last resort in all disputes or differences. In this connection it may be well to remember that under the law a corporation can act only in one way—by resolution of the board in formal meeting assembled. The directors, however, can, and usually do, delegate their executive powers to the subordinate officers of the company. These are generally the manager and the engineer, who acts as superintendent of construction unless engaged solely in a consulting capacity.

To the manager and superintendent, then, we may suppose the directors to have intrusted the construction of the plant, subject to their orders, and to the directors both the subordinate officers should report as often as required. The duties of each should be clearly understood, and their several responsibilities as clearly defined, for nothing is worse than divided responsibility, and unfortunately nothing is more common around the average telephone plant, either under construction or when in operation. It is the writer's experience that when two men have to do something the net result is always nothing, and, worst of all, no one is ever to blame, for each thinks that the other attended to it. To the board of directors there should be but two employes, and each of these should be responsible personally and absolutely for everything that is done by those under him.

To the manager belongs the soliciting of subscribers, the keeping of all office records, securing rights of way when required, advertising and other newspaper work, the designing of his system of accounting, and, in fact, all the office detail. On the superintendent devolves the designing and construction of the plant, estimating and ordering supplies and material, and, in a word, the entire field work. A well-organized force would stand about as follows:

MANAGER.	SUPERINTENDENT.
Solicitors,	City Foreman,
Bookkeeper,	Draftsman,
Stenographer.	Other foremen,
	Storekeeper,
	Purchasing Agent,
	Timekeeper,
	Stenographer.

If the plant be a very large one, the superintendent may require one or more assistants, who will exercise such authority as he may see fit to delegate to them, but, as stated before, to him alone must the directors look for the successful and economical construction of the plant, and on his shoulders must lie all the responsibility. As in an army, there is a regular sequence from the private soldier to the general; so in a well-organized crew there should be a corresponding division and subdivision of authority from the superintendent to the common laborer. Also as the general receives the entire blame for defeat and the reward for victory, so is the superintendent immediately and personally responsible to the directors for every failure and mistake, every piece of bad work and every loss incurred. To accomplish his work successfully he must have almost unlimited authority, for without it all attempts at discipline are futile.

It is needless to say that both sides of the force should endeavor to work in the utmost harmony, and to this end the manager and the superintendent should consult together frequently and advise as to the general good, but, at the same time, each should have his own duties and should allow no interference with the conduct of them.

It is also well that the board of directors should meet frequently to hear reports and discuss the progress of the plant. The superintendent should make all reports and other formal communications in writing, and should be willing at all times to cheerfully conform to any reasonable request of the directors. Many men make the great mistake of resenting even friendly criticism of their work and of attempting to stand on a great amount of dignity. A French philosopher once said that "Language was invented to conceal thought." He might well have added that overweening dignity was invented as a cloak for incompetency.

It may not be out of place to state a few of the requirements of a good superintendent. In the first place, it is assumed that he knows his business. By this is meant that he knows it literally "from the ground up." In order to get work out of his men, he should know *of his own knowledge* just how much a man can do in a day at any stated work. This knowledge can only come from long practical experience, but without it the superintendent is entirely at the mercy of his men. No class of workers can more successfully shirk than linemen and groundmen, and unless those in authority know exactly what constitutes a fair day's work they are pretty sure to be imposed upon. In the next place, he should know when a piece of work is done correctly and be quick to pounce upon every defect. This presupposes a thorough, practical knowledge of every detail of the work in question. He should acquire the faculty of deciding quickly all questions as to methods or

materials, and should not engage in long discussions when such questions come up. On the other hand, he should be willing at all times to listen to suggestions from his foremen, and if he is unable to adopt them, to give his reasons clearly and patiently.

As he will be called upon to appear before the board of directors, the municipal authorities, and possibly other bodies, he should be of good address and able to state a position plainly and without embarrassment, and to maintain such position in debate without loss of temper. The greatest address is necessary in dealing with private citizens, especially when, as is usually the case, they have a grievance. Here the finest discrimination is necessary. The first and fundamental rule is to listen to a complaint patiently and courteously; a courteous reception goes a long way toward disarming an irate citizen, and every complaint should be carefully investigated, and, where possible, a compromise settlement made. If by moving a pole a few feet a possible patron can be pacified, he will be a strong friend of the company, and it not infrequently turns out that a thing of this sort is a true "casting bread upon the waters," which will return with interest some day. If a concession can be made it should be made freely and quickly, so there will not remain with the complainant the idea that he "forced" anything. If, on the other hand, the concession cannot be granted, the reasons should be carefully explained, and only in the last resort should any determination to stand strictly on one's rights be shown. Of course, if all other methods fail, this must be done, but it is rarely necessary and always leaves a sore spot.

There will be found in every city one or two chronic kickers who cannot be reached by any ordinary methods. The eye of experience can spot one of the gentry as far as he can be seen, and it is the writer's experience that the quickest way to discourage him is to present the matter directly to the city engineer or street commissioner, without entering into any discussion whatever. The "kicker" is usually as unwelcome in the city hall as in the superintendent's office, and the local authorities generally know the most appropriate way of disposing of him. In all dealings with the civic authorities or the public, the strictest integrity must be displayed. Every promise must be carried out to the letter and without delay, for in no way can one secure the trust and confidence of those with whom he is dealing so quickly as by the prompt and faithful performance of every obligation. Too many men promise to do things, with no intention of carrying the promise into effect, and the net result of such conduct is, loss of prestige and confidence all along the line.

It must not be forgotten that in the very nature of things the city authorities are inclined to be suspicious of the man who is going to tear up their pavements and set poles in their streets and alleys. The utmost pains should be taken to secure their confidence and all dealings with them should be open and above board. If the city engineer has some little prejudices in favor of this or that brand of cement or gravel, or a certain method of replacing pavements, etc., they should be followed, unless such prejudices would operate to the detriment of the plant, and it never does any harm to consult with the powers that be on matters of rights of way and similar questions. These same civic authorities can put many a stumbling block in the way of the man who has abused their confidence or incurred their dislike, and, on the other hand, the favors they can extend are almost limitless.

It is, however, in his management of his men that our superintendent must show his greatest capabilities, for while the matters heretofore mentioned are of vital importance, the successful handling of his men makes or mars his reputation and success. In the first place he must be a rigid disciplinarian, slow to anger, but quick to punish, and himself conforming strictly to his own rules and setting his men an example of industry and zeal. Men will submit to the utmost severity of discipline, so long as it is administered with justice and if everyone from the head down is subject to the same rules. The successful handler of a large crew is never violent either in language or conduct; his orders are as few and simple as the necessities of the case may require, but every man knows that they must be obeyed to the letter or trouble will result for someone. He should endeavor in every way to gain the respect and liking of his men. In no way can he achieve the first better than by demonstrating that he is a past master of his business and knows it to the last detail, and as to the second, even-handed justice is one of the best ways to secure it. Men will do twice the work for a man whom they admire and respect, and even more important than the quantity is the quality of the work turned out.

Our superintendent will let his foremen see that he trusts them absolutely, and will be quick to praise and promote men who show themselves worthy; he will be careful to draw the line between too much dignity and too much freedom. Men are inclined to hate the superintendent whom they consider "stuck up," and on the other hand they are

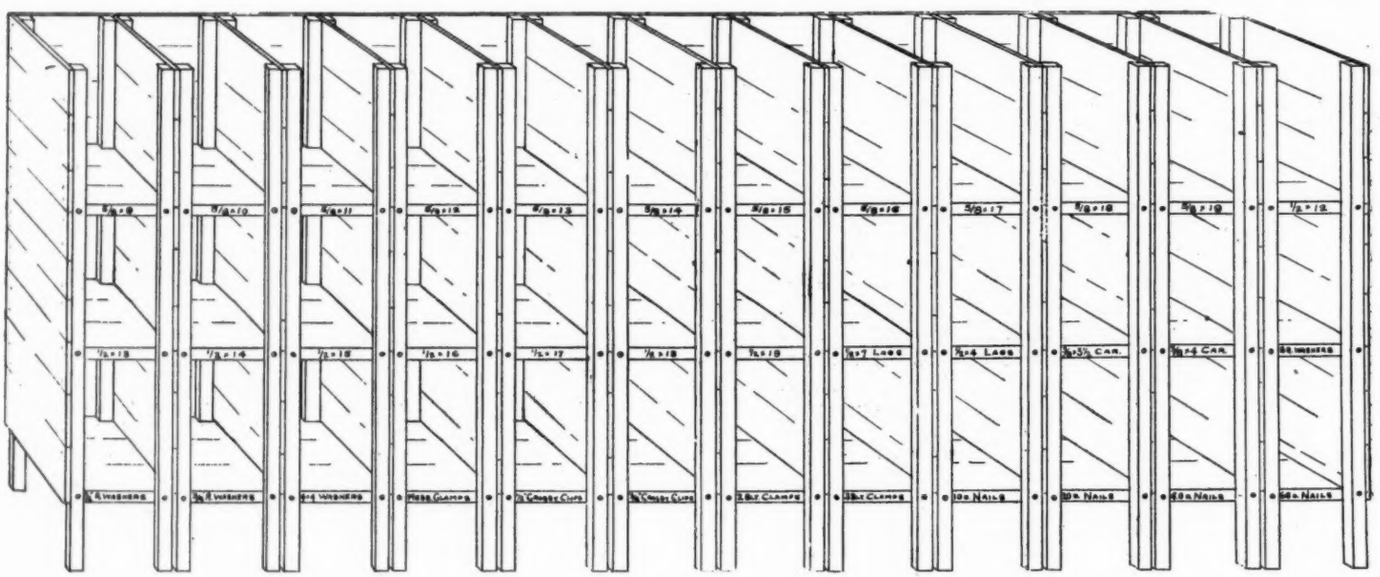


FIG. I.—BOLT RACK.

apt to think very lightly of the one who makes himself too common. One can be on terms of the utmost friendship with his men, yet never allow his standing to be impaired; and when he has learned to do this he is on the high road to success.

The humblest employe should feel that in the superintendent he has a personal friend, who is prompt to notice his good work and commend him for it, and to whom he can freely go with complaint or grievance, with the assurance that he will receive a patient hearing and strict justice.

Another great point in the handling of a crew is never to interfere with a foreman or give direct orders to the men under him. Let the orders be given to the foreman and by him be communicated to the men. If the foreman is not doing the work satisfactorily, or is otherwise at fault, he should be spoken to privately, and by no means in the hearing of the men. The standing of the foreman must be unquestioned, and his authority over his men in nowise impaired. If he is careless or slack he should be discharged without mercy, but while he is employed his authority must be supported.

Free discussion of methods and materials should be encouraged to the utmost, and the superintendent and foremen should frequently meet together to discuss such mat-

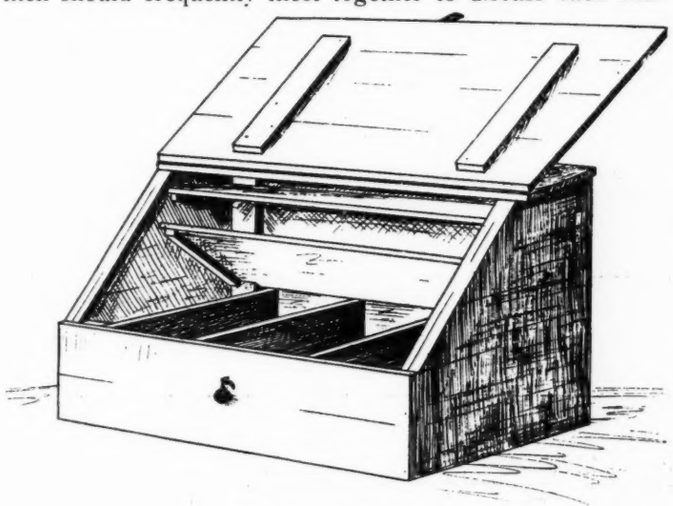


FIG. 2.—TOOL BOX.

ters, as also the progress of the work and the most advantageous ways of completing it.

Nearly all the foregoing applies with equal force to the city foreman, who is the direct personal representative of the superintendent and exercises all his authority so far as the work and men are concerned.

The superintendent should be a fair draughtsman and enough of a civil engineer to handle level and transit accurately; he should be competent to make all the ordinary cable tests and to test lines for trouble; he should be a good mathematician and acquire the habit (for it is nothing else) of strict accuracy in his computations. He should know materials and tools better than the men who sell them and keep himself thoroughly up-to-date on all points connected with his profession. He should read regularly all the technical journals available, and pay particular attention to the advertising columns that he may be constantly advised of "what is doing." He should not confine his technical reading entirely to matters telephonic, for by so doing he will make his professional horizon very narrow. No sound knowledge of electrical matters will ever be a detriment to him, to say the least, and, on the other hand, he can never attain a real knowledge of telephone currents without a thorough grounding in general electricity. The modern telephone plant, with its numerous dynamos and motors, varying frequencies and polarities, is a vastly different proposition from the magneto exchange of five or six years ago and requires a much higher knowledge of the science in general.

These are some of the requirements so far as the outside public and his own men are concerned. As to his employers, his duty may be stated in two words—absolute honesty. They are entitled to receive the best he has of ability, zeal and diligence; his every effort should be put

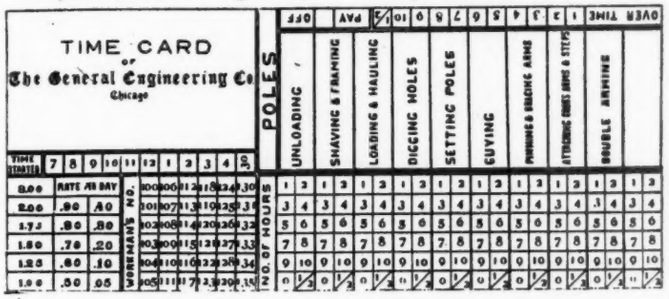


FIG. 3.

forth in their service and for their benefit; his every move should be made with an eye single to their interests, and he should allow nothing to get between him and his duties. In selecting or recommending materia! or apparatus, he should allow no friendship or good fellowship to bias his judgment, but should act for his employers with even more scrupulous integrity than if acting for himself. He should never discuss business matters with outsiders, but should look on them as inviolable secrets. In a word, he should so demean himself as to deserve the confidence reposed in him and prove himself as good a servant as he is a master.

The draughtsman's duties are so self-evident that they require no special mention. One thing, however, he should do, and that is, turn out even the simplest designs with the perfection of finish. This is a more important point than would naturally be supposed, for it is the writer's experience that when a foreman has a well finished and neatly executed and lettered drawing or blue print to work from, he is apt, unconsciously, to try to make his work correspondingly neat. The draughtsman should be provided with ample space in which to work, and while construction is in progress he should be used constantly in getting out details for the various foremen. As a rule, no special work should be attempted without good working drawings, so that the foremen can see and understand exactly what is required. No machine shop or foundry material should ever be ordered unless the order is accompanied by a detailed drawing of what is wanted. In this way all mistakes

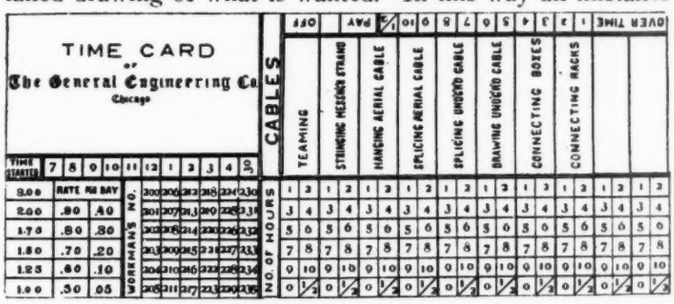


FIG. 4.

and misunderstandings are avoided, and if any such occur the responsibility for them is self-evident.

A blue printing outfit is convenient, but as a rule it is more economical to have printing done by some local engineer or architect who has the necessary appliances. In this connection the writer would like to recommend the modern system of white printing, which produces brown or black lines on a white background. The process is somewhat complicated, but the results are incomparably superior to the old blue print. Close inspection is necessary to dis-

tinguish one of these prints from an original drawing, and they can be written or drawn upon, either in pencil or ink, precisely as if made on drafting paper. The only additional expense is in the making of the negative, and, when several copies are required, there is practically no difference in cost between them and a similar number of blue prints.

The storekeeper is a most important member of the force and for his accommodation a large and substantial warehouse, located, if possible, on a side track, should be provided, with plenty of shelves, lockers, racks, etc. He should be required to keep his stock and tools in apple-pie order—ropes neatly coiled and hung up, stock carefully sorted and

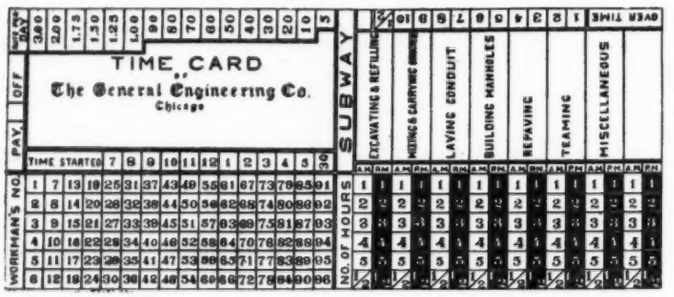


FIG. 5.

stored, tools clean and repaired—in fact, "a place for everything and everything in its place." In order that he may do this successfully some pains must be taken in fitting up the warehouse. One of the important furnishings is a bolt rack, in which each size of bolts can be kept separately. The writer imagines that every reader has at some time in his experience had the pleasure of pawing over a few hundred "mixed bolts" in search for one. The sketch herewith—Fig. 1—shows a good form of rack, and one which can be built very cheaply; it has also the advantage that it can be knocked down for transportation if desired. As shown, the bottoms of the divisions are two 2x10-inch planks running lengthwise, supported by standards and cross-pieces. The standards are double, being of 2x2-inch pine, and the partitions are simply slipped between them. As shown, the rack contains thirty-six apartments, each 20x24x 18 inches, but, of course, it can be made any size desired. There should also be furnished two good-sized tool boxes for the smaller tools. These should be fitted with shelves and racks so that any tool can be reached instantly. The illustration shows one of these boxes standing open. It is also advisable to make several boxes of the general style shown in Fig. 2, for the use of the line crews. These should be about 24x6 inches in width and two feet high at the highest part. Their cost is practically nothing, and they effect wonderful savings in time on the work by enabling the men to lay their hands immediately on what they require. When the wagons come in at night, the boxes can be unloaded quickly and without confusion, and the storekeeper can have them refilled ready for the next day's work.

The warehouse should be opened at least twenty minutes before the time for commencing work, and kept open until the last wagons are in at night. In order that the storekeeper may keep his stock in shape, he should be furnished with printed stock sheets in which are listed every item that enters into the plant. The form used by the writer contains five columns—"On Hand Last Report," "Received Since," "Issued Since," "On Hand," "Required to Complete." One of these is turned into the office each week, the last column, of course, being left blank, and these sheets afford a vast deal of valuable information, showing at a glance the exact condition of the stock and the various items used during the week.

A tool book is also kept, in which the several foremen are charged with all tools taken out by their crews. This book is "balanced" at least once a week, and the responsibility for lost or broken tools fixed. In addition to the regular construction tools, which will be treated of in a subsequent chapter, there should be installed in the warehouse platform scales, a good bench with vises, etc., a pipe vise, a set of taps and dies, a grindstone, an emery wheel and a small portable forge with its appurtenances. These tools cost but little and will save many an expensive journey to the machine or blacksmith shop. A room adjoining the warehouse proper should be devoted to the use of the foremen for making up their daily reports and should be furnished with tables, chairs and a row or two of lockers. The technical journals can well pass from the office to this room, and it is somewhat surprising to see how eagerly they are read.

The superintendent's office should preferably be located in the warehouse, so that he may at all times be close to headquarters and keep in touch with all that transpires. One of the greatest conveniences that can be imagined is a large drafting table—as large as the size of the office will permit, on which a whole series of plans or maps can be spread side by side. Anyone who has tried to handle two or three large maps on an ordinary 36x48 drawing board will appreciate this feature. In addition to the large board there should be one or two folding boards of any of the standard patterns, and the necessary complement of office furniture. The illustrations herewith show some views of a fairly well equipped office and warehouse.

The purchasing agent is employed only on very extensive plants and his duties are self-evident. In most plants either the manager or the superintendent exercises the functions of this officer. The main point is that someone should have absolute powers in this direction. As we are dealing chiefly with the construction end, it will suffice to say that unless the superintendent is also the purchasing agent

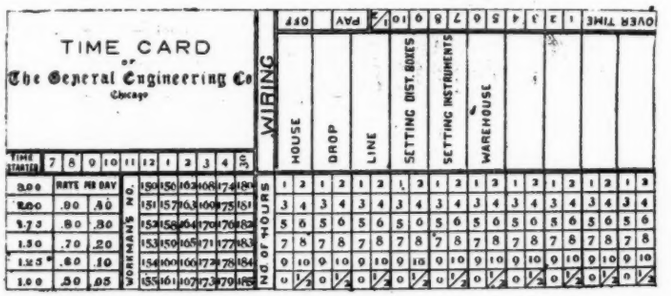


FIG. 6.

he will turn in written requisitions for what material he requires. If he has a preference for any particular make of material he is entirely at liberty to specify it in his requisition, and it is an undoubted part of his duties to make any tests required by the purchasing agent. In reporting on these tests he should go largely into the details of the methods pursued so that he may furnish a report that means something. A report of this nature on a sample of rubber-covered wire is here given as an illustration:

_____,

Purchasing Agent,

_____.

Sirs:—

Pursuant to your request I beg to report that I have tested the sample of rubber-covered wire submitted to me by you on the 20th ultimo, as follows:

Nov. 22—Received 2 coils, 1,830 feet, rubber-covered wire tagged _____.

Nov. 24—Cut two 100 ft. samples from each coil, one from end of each and one from middle portions.

Gross diameter of wire (average of 20 measurements) 209 mils.

Diameter of conductors, 64 mils, No. 14 B & S. gauge.

Diameter under braid, 162 miles (average of 20 measurements).

Conductor—Hard drawn copper.

Thickness of rubber wall in 64ths of inch, 29 (average of 20 measurements).

Conductor not truly centered at any point measured; in some cases 1-32d to one side.

Rubber somewhat harsh and brittle; breaks under slight pull and shows little elasticity.

Braid—Very good, but a trifle loose. Separates easily from rubber.

Weatherproof compound—Not enough. In some cases braid almost bare.

Under these circumstances I do not consider this wire sufficiently good for our purposes. If, however, you wish insulation resistance or any other tests made I shall be glad to make them.

Respectfully,

————————, Supt.

If the superintendent acts also as purchasing agent he should allow nothing to go into stock without careful inspection and test. In specifying material to the manufacturer he should be careful to state exactly the quality of goods he requires, so that no dispute can afterward arise. An order for poles might read as follows:

Gentlemen:—Kindly ship at once to us here the following poles:

55's	30	45's	325
50's	175	40's	460

These poles to conform strictly to the specfication hereto annexed, which are made a part of the order, and on which you have already quoted us and to be delivered here at the following prices: ———————— as per your quotation of ————. Terms 30 days less 2 per cent for cash in ten days. We prefer that you ship the larger sizes first, if possible.

Kindly advise us on this point and also when we may look for the first shipment. It is understood that the entire order must be shipped within 30 days of this date.

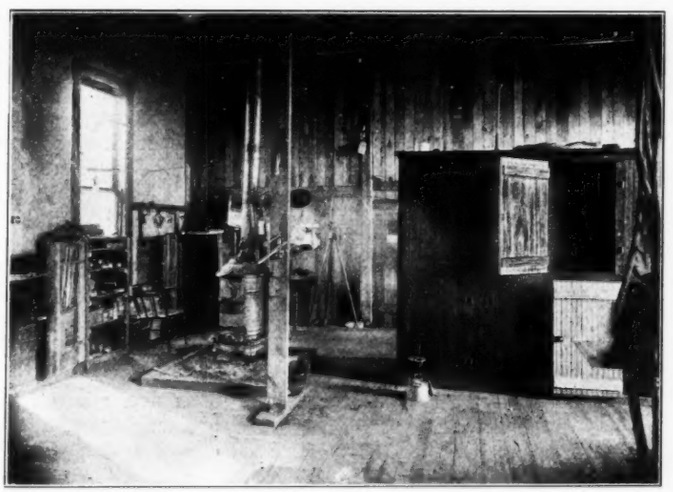
Very truly,

————————, Supt.

An order of this sort leaves no room for discussion or misunderstanding, as it is complete within itself and requires no reference to prior correspondence to determine either quantity, price, quality, terms or time of shipment.

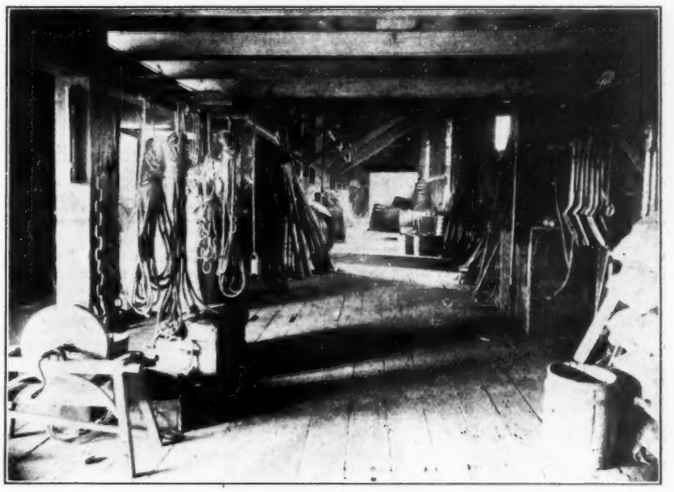
The warehouseman should be furnished with a "received material" sheet, which is turned in to the office daily. A well-approved form has the following headings: "Quantity," "Description," "Shipper," "Car No.," "Charges Paid," "Remarks."

The common practice of giving the storekeeper copies of invoices and allowing him to check receipts from them is radically bad. Make him count, weigh or measure all material received without any knowledge of what the invoice calls for, and his reports will be of some actual value.



FOREMAN'S ROOM.

After the location of the warehouse and office, the next step is the selection of a suitable place for the pole yard. As a rule, the railway companies are able to furnish vacant grounds adjoining their tracks. If more than one location be available, the one nearest the center of distribution of the plant should be selected, due care being taken, however, to compare the state of roads leading into each, freedom from floods, drainage, etc. The yard should preferably be long and narrow, 400x150 feet being a very convenient size. The long side should, of course, be on the track, so that the various sizes of poles may be kept in separate piles. The importance of the careful location of the yard cannot be overestimated, for it is a fact well known to all construction men that the cost of hauling out poles on a large plant will equal the cost of shaving, framing and setting combined. From this it will readily appear that large savings can be effected by having the yard as nearly at the center of the plant as possible, with the best available means of exit. If a more satisfactory location than the one offered by the railway company can be had for a reasonable rental, it is usually good policy to choose it. It must be remembered that a load of long poles requires a lot of room to turn in, so plenty of space must be left at the ends of the yard for the teams to get out. The pole yard foreman should be provided with a suitable book in which to enter the poles as received and as sent out day by day. He should count the poles on each car before unloading, marking each with a piece of chalk that none will be overlooked, and before commencing to unload he should advise the office of his count, so that in case there should be any discrepancy between it and the invoice it may be looked up while the poles are still on the car. The handling and inspection of poles will be treated later, and for the present it will suffice to say that the superintendent should not allow material of such vital importance and great value as poles to come on the works without his personal inspection, although so far as that is concerned it is the writer's idea that he should personally examine and inspect every bit of material that is received, no matter how unimportant it may be.



VIEW IN WAREHOUSE.

The keeping of the labor account is one of the most important, as well as the most difficult, features in the successful and economical construction of a plant. Material of all kinds can be readily listed and the invoices will show exactly what has been purchased and the price paid for each article, but as a rule when the work is completed, the only labor record available is the bald fact that so many dollars have been expended on this item. In no other department would such laxity be tolerated, nor should it be in this, and yet it is a safe guess that not one plant in one hundred can produce figures other than estimates which will show in detail where the pay rolls went to. Almost every manager can tell to a foot how much cable he has in service, but it is rare that one can be found who knows how much it cost to install that cable, and yet surely one piece of information is as valuable as the other. Further, when a man is called on to estimate the cost of some proposed work, how can he possibly do so with any approach to accuracy, unless he knows what similar work has cost

in the past? The writer ventures to suggest that this is one of the reasons why conservative capitalists are prone to fight shy of telephone investments, for he has heard such men say more than once that when they put money into anything else they knew beforehand just what it was going to cost, but that in a telephone proposition a $50,000 estimate generally means a $70,000 plant before it is completed. We may take it for granted, therefore, that it is a most desirable thing to keep exact records of the labor cost on each section of the work. The following method is the one adopted by the writer's company, and is the result of many experiments along this line, and one which it is believed constitutes the simplest and most accurate system yet devised. In the writer's own practice it has proved eminently successful, and several of his friends who have tried it have had equally good results.

For the purposes of these accounts the work is divided into four general sections—subway, poles, wiring and cables

THE _____ CO.

This envelope is to be used for enclosing the Daily Time Tickets of the workmen, and any other papers that are to go to the office. The date of the Time Tickets enclosed is to be indicated by punch in date column below. Each foreman must turn in his reports daily in one of these envelopes.

LOCATION OF WORK.

DATE | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31

MATERIAL USED.

AMOUNT OF WORK DONE.

FORM FOR TIME TICKET ENVELOPE.

—and a separate time card is prepared for each. These are illustrated in Figs. 3, 4, 5 and 6, which exhibit clearly the several subdivisions into which each is separated. Each employe is numbered, and while on duty wears a button bearing his number. The foreman punches a ticket each day for each man, and turns it into the office at night in the envelope illustrated in Fig. 7. Thus, suppose that No. 101 has put in four hours unloading poles and five hours shaving and framing, the foreman would punch out, first, the man's number (101); second, "4" under "unloading poles"; third, "5" under "shaving and framing." If the man be newly hired he would punch also the time he commenced work and the daily wage, in addition to which he would enter the man's name on the ticket, so the timekeeper would know to whom to draw the pay check. Space is also provided for overtime, and if the man be discharged the foreman's punch in the "pay off" section is all the authority the office needs to issue his check.

The subway cards are divided into A. M. and P. M. divisions, as they are handled a little differently. As the conduit crew is comparatively large, the foreman might make mistakes in punching his men, which he can hardly do with a small crew of ten or twelve, so their tickets are punched on cardboard and one is handed to each man when he commences work in the morning. At this time no punch mark is necessary, but some time shortly before noon the foreman passes among the crew and punches each ticket with the bearer's number and the forenoon time under the proper heading, and hands the ticket back to the man. The same thing is done in the afternoon just before or at quitting time, and the tickets are then taken up. This makes each man in a measure responsible for his own time, and he will never allow the foreman to pass him by. The same system could be followed with the other crews, but as they are generally small it is hardly necessary.

The net result is that the time is turned in *every night* and each day's work of each man assigned to its proper subdivision. Under the common system of having each foreman carry a time book, no subdivision of the work is possible, and worse even than this is the fact that the foreman is more apt to enter the time once or twice a week than

Contract_____ Order No._____
Put this Number on your Bill.

THE _____ CO.

_____ Date_____

_____

Please Deliver to_____

The following material and render Bill to us at_____

Material for_____ THE _____ CO.

Location_____ By_____

Deliver goods only on order signed by an officer of the Company.

FORM FOR REQUISITION BLANK.

once a day. The envelope in which the tickets are turned in must show (1) the date (punched in the margin), (2) the location of the work, (3) the material used, and (4) the amount of work done. In addition to the time tickets the foreman encloses any memoranda, such as cement, sand or stone tickets, statements of material required or other matters he may wish to go to the office. Four pay-roll sheets are ruled up each week, one for each of the main divisions of the work, and on these the subdivisions are repeated six times, one for each working day. The sheets found most convenient by the writer are 18x24 inches in size and one of them is here reproduced.

It will be noticed that the subdivisions are entered in dollars and cents, not in hours. In this way a complete cross check is had, as the vertical footings added across must equal the total pay-roll. This system is almost automatic in its simplicity, and practically "keeps itself." With such modifications of detail as desired, it can be made to fit almost any department of the business. The daily envelopes are copied into a book having separate pages for each foreman, so that each day's work can be compared. This book has the following headings: "No. Men," "Total Hours," "Total Cost," "Work Performed," "Foreman." This makes a neat record, and enables one to keep accurate track of each crew. If, for instance, a crew has dug sixty holes one day, and only thirty the next, an explanation is due from someone. More than this, the foremen soon learn that each day's work is scrutinized, and this knowledge

works wonders in inciting them to secure a fair day's work from their men.

When the plant is completed a record will be available that will show the exact cost of each subdivision of the work, and, as stated before, this knowledge, as a basis for future estimates, is beyond value.

Before active operations are begun, indemnity insurance should be taken out, covering not only the employes, but the general public as well. The premiums for this insurance are a percentage of the pay-rolls, and while it is somewhat costly it is one of the precautions that every sensible man will take. As a rule, the percentages differ slightly for different parts of the work, and very properly, for the man digging holes is in no such danger of accident as the man who is stringing wire or doing other aerial work. All policies contain a provision authorizing the insured to obtain such surgical aid as is immediately required in case of accident, and the "Special orders to foremen," which follow, are intended to comply with this clause.

When ready to begin work a general order should be written and posted in the warehouse and the foremen's room. This may be of the following form:

(1). All employes will report for duty promptly at the time and place ordered by their foreman. Men failing to so report will not be allowed to begin work till quarter time.

(2). Under no circumstances will any employe suffer himself to be drawn into a dispute with any private citizen. Refer all complaints to the foreman in charge. Exact courtesy must be shown in all dealings with citizens.

(3). Any employe entering a saloon in working hours will be summarily discharged. *No exception will be made to this rule.*

(4). Habitual drunkenness will be considered cause for dismissal.

(5). All tools will be charged to the men taking them from the warehouse, and tools lost must be paid for. Broken tools must be returned.

(6). Each man must wear his number button while on duty. Lost buttons will be charged at 25 cents each.

(7). Employes will be paid on Saturday night for time to the night preceding.

SUPERINTENDENT.

In addition each foreman should receive a copy of the following:

SPECIAL ORDER TO FOREMEN.

(1). In case of accident to any of your men you will, if the accident is serious, obtain such conveyance as required and take the injured man to Dr. ————, whose office is at ————, or to such other surgeon as can be most readily reached, and immediately inform the office of the accident. In case the injured man cannot be moved, telephone or send for a surgeon immediately and send another man to the office. If the accident be not serious, but the injured man seems to require surgical aid, accompany him to the surgeon's office and report as before. Be prepared to make a detailed report of the accident and collect and preserve carefully any broken or defective tools or apparatus causing the same. In no case allow the injured man to go alone to the surgeon. Do not talk yourself or allow your men to talk to inquisitive strangers or newspaper reporters. Refer them to the office.

(2). In case of accident to an outsider follow the foregoing rule as to details, but send a man to the office by the quickest available conveyance and send another to the nearest telephone to call the office up. Especially see that the company's surgeon is called or the injured person conveyed to his office immediately. If the accident be in the vicinity of the injured person's home and he or his friends desire to have him removed there, do so, but send at once for the company's surgeon and have him examine the patient.

(3). If necessary in either case call an ambulance and convey the injured person to the nearest hospital.

(4). In any case report to the office the names of all witnesses and any statement made by the injured person.

Each employe should be registered as soon as he commences work and the register should be very carefully kept; it should show under appropriate headings the name of the employe, his local address, the capacity in which he is engaged, date of hiring, his home address, whom to notify in case of accident, and the date of his leaving the employ of the company. The usefulness of this register is self-evident.

For small local purchases a form of some such nature as shown in Fig. 7 should be provided, and the local merchants should be given to understand that no employe has any right to purchase goods for the account of the company. These orders are most handily made up in books of twenty-five, interleaved with blank sheets and with a carbon sheet attached to the inside of the back cover, so that it can be folded in between the order and the blank sheet and a copy taken. These books should be about 4½x8 inches, so they will easily slip into the pocket.

PAY ROLL.

WIRING No.———— Date————

	Workman's No.	NAME	Rate per Day	*MONDAY							Total Days	Check	
				House	Drop	Line	Setting Dist. Boxes	Setting Instruments	Warehouse				

*The subdivisions under Monday—Rate per Day, House, Drop, Line, etc.—should be repeated for each of the six working days in the week, and the pay-roll sheet should be made long enough to take in the names of all the employes.

FORM FOR PAY-ROLL SHEET.

This is the first of a series of twelve articles by Mr. Minhinnick on the outside construction of a telephone plant. The next article will treat of surveys, locations and maps.

CHICAGO AFTER BELL COMPANY.

The city of Chicago has begun a campaign to force the Chicago Telephone Company to open its books for inspection. The Circuit court has been asked to compel an accounting with the municipality. It is alleged that since 1889 the corporation has withheld between $350,000 and $500,000 which should have been paid into the treasury under the three per cent gross receipts compensation clause. The dispute is over the receipts in the districts annexed to Chicago since 1889, including the towns of Hyde Park, Cicero and Lake. The opinion of the company's counsel is that the ordinance of 1889 did not extend outside of the old city limits. For the last fifteen years the city has denied to the company the exercise of any privileges in the annexed territory under the ordinance containing the agreement to pay three per cent upon gross receipts from telephone business within the city.

Conventions of Independents

SOUTH DAKOTA INDEPENDENT TELEPHONE ASSOCIATION.

THE annual convention of the South Dakota Independent Telephone Association was held at Sioux Falls, January 11 and 12. There was a large attendance of members and the programme presented was of a highly interesting nature. All the sessions were well attended and marked by enthusiasm and interesting discussions. Numerous telephone manufacturers and supply houses were represented by exhibits, which attracted much attention, as well as being highly creditable to the firms making the displays.

The first session of the convention was held Wednesday afternoon. The meeting hour had been fixed for 3 o'clock, but owing to the delay in the arrival of trains the meeting was not called to order until some time after that hour. It was strictly a business session, at which the annual address of the president, the report of the secretary, and matters of interest to the Independent telephone business of the state in general were discussed.

There was a large attendance at the evening session, and most of the papers which appeared on the programme were read. H. J. Minhinnick of Sioux City, Iowa, handled the subject of "Cable Construction and Electrical Engineering as Applied to Telephony" in a masterly manner, holding the attention of those present for almost an hour.

The paper by I. J. Kusel of Chicago on "Automatic Apparatus and Its Relation to the Manual, and Vice Versa," was listened to with marked attention. It follows in full:

The progress of the age is always responsible for something better. This condition exists in all lines of human endeavor, and is no exception in the telephone field. The demand for improvement is always with us, and the old adage, "Nothing can be done so well but that it can be improved upon," is again no more the exception to the telephone field than can be cited in all other branches of industry. The result of the condition thus mentioned is responsible for the production of automatic telephone apparatus, and in consequence we now have it with us.

Why should not the connections through a telephone exchange be made automatically, or rather by the aid of automatic apparatus? In reality, it is not absolutely and truly automatic; there is some manual effort required to make such connections. But why should not such work, if such it can be termed, be done by the assistance of a machine, just as well as we now employ the typewriter to assist us in our correspondence, and with advantage?

It is not necessary at this time to point out the advantages nor the practicability, as well as the success of the automatic apparatus; but in years past, like Banquo's ghost, it "would not down." The result to-day is that successful commercial automatic telephone systems are now in use. One of the most successful automatic telephone systems ever devised and placed upon the market is the Clark, and the main reason for the pronounced success of this particular system is because of its simplicity. Simplicity in any piece of mechanism, where it accomplishes the desired results, makes for success, and it may be pointed out, and with credit, that the Clark system, which has now been upon the market some five years, has demonstrated its practicability and is an absolute success.

Any engineer or telephone man, either in the Bell or Independent field, who believes that the manual system is the only system, to the detriment or adoption of the automatic, or vice versa, in instances where one system may fit better than the other, is governed in his views by the father to the thought—*i. e.*, that the one in which he may not be directly interested shall not be successful. But to the liberal and broad-minded telephone man or engineer who views this matter from the points of view of the subscriber, the operator, the investor, and last, but not least, the public's demand, must grant that each, the manual and automatic, has its place.

Like the old adage, learned by all of us many years ago, "Circumstances alter cases," the automatic system, in place of being, as many believe, a detriment to their investment, can be made an assistance, and in this paper it is my desire to point out to such, giving reasons, why and how the automatic can be made an assistance to the manual exchange. I wish to state that my observations are taken from a large number of exchanges, and from these I shall discuss the point in question: To what exchanges and to what places is the manual apparatus best suited? And vice versa, as regards the automatic.

First, let us cite the largest Independent automatic system in the world, namely, Chicago, Illinois, and for the purpose of drawing a comparison, we will cite the second largest manual exchange in the world, namely, Chicago. It is true in comparing these two exchanges that the Bell has upward of 100,000 telephones in its Chicago system, while the automatic has but slightly more than 10,000. As close a comparison cannot be drawn, on account of the comparative great difference, as I will show later on, but a relative standing, as to the satisfaction in service that the public is receiving, can and will be shown by the fact that the 10,000 automatic telephones spoken of are located practically within the business district of Chicago, which, in the commercial world is known as "The Loop," while within this same district the Bell has approximately 30,000 manually operated telephones. That the Automatic Company is giving good service within the district mentioned cannot be gainsaid, but that the general public are as willing to use the manual system as the automatic proves, from actual experience in a large business American city, that, under such conditions, one system is just as desirable and as much in deamnd for telephone service as the other.

The automatic has one great advantage over the manual—*i. e.*, secret conversation, if such it can be called. On the other hand, in the manual inter-connection to the many private branch exchanges, of which in the city of Chicago there are upward of 500, may be cited the fact that, to this day, and in the present state of the art, nothing has been yet invented or discovered that can make such connections without the aid of a manual switchboard. And so I might go on and cite point for point, and in the end find that the manual system stood 100 per cent in public favor, as also of automatic, neither gaining or losing by comparison. What the public wants is good service; they do not care whether it is manual or automatic; they want good service, first, last and all the time.

From the investors' standpoint, one system can be brought into a comparative argument with the other. In large exchanges, such as the one just mentioned, there is practically no saving. It is like the fellow who walks a mile, and then rides a mile, to reach his destination—there are two ways of getting there. In the manual he walks a mile first, and then rides a mile; in the automatic he rides a mile and then walks a mile. They both get there, and they both expend the same amount of effort. In the operation of large exchanges, one pays money for operators, the other pays it out for high-grade electricians and experts. While certain makers have submitted figures to substantiate certain claims and contentions, from a maintenance standpoint, the writer has made it a point for the last three years to visit these various exchanges, and has very carefully made notes pertaining to that particular, and positively asserts that such comparisons show one general result, when other items are also added to the maintenance of the large automatic system, which can and should be charged to that same account.

It is the small, or moderate sized, simple, economically managed, inexpensively operated automatic telephone systems that give to the public a satisfactory service, and at the same time show an advantage over the manual system, from the cost of maintenance standpoint. In small or medium sized automatic telephone exchanges it is unnecessary for complicated apparatus, and this, as can be observed, points the way for the reasons just set forth.

Every large railroad throughout the country and abroad is governed in its strength by its "feeders." So also, in comparison, is every telephone exchange strengthened or weakened by its surrounding exchanges, and particularly by the smaller plants, and group of plants that operate in conjunction and are either owned directly or indirectly with the main exchanges. These small plants, some of them reaching in size up to 500 lines, increase or diminish as the case may be, by their number, the earnings of the main exchange, and as telephone service, which, unlike any other commodity, is enhanced in value by the greater number that may be served, so also an exchange whose service reaches only, say 300 subscribers, is worth one-half of the exchange that reaches 600. How to give service to these branch exchanges, and at a profit, has been a question that is now solved by such automatic systems as the Clark.

To cite a comparison, the cost of maintaining 100 telephones of the Clark system in a branch plant will not exceed for cost of maintenance, attention, batteries, repairs and the like, a sum total of more than $50 per annum, while to be operated by a manual operator, an exchange of this capacity could not be operated at a cost of less than $300 to $600. It is plainly evident from such conditions that the

automatic system has its place as an assistant, and an enhancing value to the manual. That the monopolistic company agrees with me on the points set forth is proven by the fact that it has just lately, after a long and unquestionably exhaustive investigation, arrived at the same point of view, as it is now offering to its subordinate companies an automatic system to accomplish just such results, and has lately issued a catalogue setting forth the feasibility of accomplishing such desired ends.

There are now, counting the Bell's automatic telephone system, four commercial automatic telephone systems on the market, but the simplest, most successful, most highly endorsed, is the Clark. This system has the endorsement of over fifty companies, owning plants that have been in operation for from a few months to upwards of five years—long enough, at least, to prove its absolute success.

Again, where the automatic system can be made of assistance to the present manual exchange is by the increased earning power of the smaller plants, all of which pay dividends, bringing about the general desired result of satisfactory service and dividends.

J. L. W. Zietlow of Aberdeen, South Dakota, read a paper on "Telephone Construction," which treated of local conditions in an interesting manner.

J. A. Steninger of Parker, South Dakota, was given the subject of "Farmer Lines," and spoke as follows:

I realize that the subject of rural lines, rural service or rural line construction is a broad one, and one that has caused the average exchange managers more trouble than any other feature of the business. But the problem must be met and is being met in different ways and by different methods—in some instances quite successfully, in others not so much so. Viewing the matter from the standpoint of an exchange manager, I believe that each individual exchange should own and operate its own rural lines and that the territory of each exchange should rightfully extend half way to that of neighboring exchanges unless otherwise agreed upon by the parties in interest; that the rates for rural service should be based upon the rates for residence service in the towns or cities and paid annually in advance.

First, I believe that each individual exchange should own its rural lines, that it may not only give the free use of same to its city subscribers, but that the rural subscribers may have free use of the city lines as well as with each other, thereby doing away with service records, etc.

Second, that contracts may be executed that will govern the use of the lines as to the rights and privileges of subscribers.

Third, that in view of the fact that it is more expensive to reach rural than city subscribers, the former should be willing to help meet at least the initial expense by paying one or more years in advance. I also believe in the interchange of rural service to a certain extent, viz., where the rural lines of an exchange meet those of a neighboring exchange arrangements should be made for a switching station between said lines, that the subscribers of that locality may not only have free service with each other (except that of a switching fee), but the use of the markets in either direction. I am not, however, in favor of giving the city subscribers of one exchange free service with those of another exchange, which, in almost every instance, would violate our contracts with the toll line people.

I would limit the free use of rural subscribers of one exchange to the intermediate and city subscribers of the next, charging a fee for service to all other subscribers, unless otherwise mutually agreed upon by the exchanges in interest. I believe that exchanges should protect each other not only by dividing the territory between them, but by adopting contracts and rates as nearly uniform as possible, that there may be no special inducement to break territory on that account.

As to the construction of rural lines, I would say that I do not favor anything less than 5-inch 20-foot poles (5-inch 25s at highway crossings), thirty poles to the mile, gained for two cross arms, nicely lined up and thoroughly guyed. I would build out in each direction from the exchange to the limit of my territory (as nearly as possible), with a grounded line of No. 12 BB wire (if not a metallic line) as a starter. Later on, as the business demands, add cross arms, making trunk lines of initial leads to fill in between same, or, after the first grounded line is run by adding a second (either on brackets or cross arms) and transposing, you can make it metallic and add grounded extension or branches by the duplexing method, but do not attempt to run two or more grounded lines for any distance along the same poles. You cannot give satisfactory service in that way.

Farmers as a general thing are a good, honest class of people and are willing and often anxious to pay a good, fair price for good service, and because exchange managers, by reason of their owning the rural lines, can make and carry out contracts more successfully than where the lines are built and operated on the mutual plan, many prefer to become subscribers to the former rather than the latter. Managers should keep closely in touch with rural as well as city subscribers to see that the rights of all are observed. If troubles arise (as they will occasionally between subscribers or between subscribers and operators), see that they are adjusted, not always over the line, but in person or by mail; keep down overtime as much as possible, especially when two or more circuits are involved; charge non-subscribers for the use of rural lines, furnishing record and report blanks to subscribers, having them report monthly and allowing them a commission on all money collected, except for tolls or messenger service on toll or long-distance lines.

Enter into a contract with every rural subscriber that he will not only forfeit his right to the service, but the money advanced for same in case of willful and persistent violation of the rules and regulations to which he subscribes; on the other hand, give him a contract that will guarantee to him the service you agree to perform for the money advanced. Explain the necessity of certain rules and regulations and they will gladly subscribe to them and assist the manager in carrying them out.

Other papers were: "Forecast of the Future Life of Telephone Construction as Applied to Local Exchanges," J. J. Nate, Minneapolis; "Cedar Poles," H. S. Gilkey, Minneapolis.

The subjects of "Central Energy and Battery System" and "Switchboards, Their Care, Etc.," were also discussed.

Thursday morning and a greater part of the afternoon were given over to an inspection of exhibits. Late in the afternoon the final business session of the association was held, when it was voted to hold the next annual meeting in Sioux Falls, and the following officers were also elected for the ensuing year:

President, C. B. Kennedy, Canton; vice president, J. A. Steninger, Parker; secretary-treasurer, H. B. Hartwell, Irene.

The next convention will be held on the second Wednesday in January, 1906. Before adjournment the convention passed resolutions thanking Sioux Falls in general, and the proprietors of the Cataract house and the South Dakota Telephone Company in particular, for the excellent service and the efforts made to make the meeting a pleasant one.

The convention was brought to a close by a banquet at the Cataract Hotel Thursday evening, which was a highly enjoyable affair and a fitting finale to the most successful convention ever held by the Independent Telephone Association of South Dakota.

NEBRASKA INDEPENDENT TELEPHONE ASSOCIATION.

Nebraska telephone men were very much in evidence at Lincoln, that state, January 18 and 19, in attendance upon the annual convention of the Independent Telephone Association of Nebraska. If the enthusiasm which pervaded the sessions of the Lincoln convention is any criterion then the Independent movement and the organization spirit are spreading in Nebraska at a most amazing rate. The attendance of Independents from all parts of the state was unexpectedly large and the manufacturers' exhibits were the most pretentious ever made at a telephone convention in Nebraska.

The opening session was held on Wednesday afternoon at the Lindell Hotel, President Clark of Papillion presiding. The time was principally taken up in discussing plans for improving the toll service of the various lines over the state.

Wednesday night the members of the association spent the time examining exhibits and inspecting the automatic telephone plant. No session was held.

The Thursday morning session began late. The members inspected the vast variety of telephonic apparatus until nearly 11 o'clock. After reports of committees officers were elected as follows: President, W. E. Bell, York; vice president, C. J. Garlow, Columbus; secretary-treasurer, G. T. Everett, Columbus.

A clearing house for the Independent companies of the state will be established. A favorable report was submitted by the committee to which was assigned the duty of passing upon this proposition and it was adopted. In co-operation with the executive board it will perfect a plan for a clearing house by which all the toll lines of the Independent companies may secure a just division of long-distance tolls. A report is to be made on this matter some time in March, to be carried to every board of directors in the Independent

telephone business with recommendations for adoption. All who join, according to present plans, must sign a contract to belong for two years. On the committee were: J. C. Killarney, Auburn; F. E. Ebersole, Lincoln; G. T. Everett, Columbus; W. E. Bell, York; T. H. Pollock, Plattsmouth.

Standardization is another object of the organization. The committee appointed to make a report on this subject asked for more time, through Mr. Ebersole, its chairman. He said it would take ten days or more to outline a plan. On his recommendation the report will be submitted to the executive board with full power to approve or reject the report. The desire is to set in motion a plan to establish eventual uniformity among the systems of the various Independent companies. On this committee are F. E. Ebersole, Lincoln; O. M. Thorpe, Wahoo; W. E. Bell, York; A. N. Munn, Nebraska City; T. H. Pollock, Plattsmouth.

On motion the constitution of the Pennsylvania Independent Telephone Association, which maintains its loyalty to the national organization, was read and referred to a committee composed of Ebersole, Clark and Hansen, to report with recommendations as to changes that would benefit the Nebraska association. The committee on constitution later reported that it saw no occasion for any change to be made to the present constitution and no advantage in joining the National Association, which report was accepted.

On motion the time and place for the next annual meeting was left to be decided by the executive committee.

TEXAS INDEPENDENT TELEPHONE ASSOCIATION.

That the Independent telephone interests of the Lone Star state are alive to the situation and have become thoroughly imbued with the spirit of organization was manifest at the meeting held in Dallas, Texas, on January 5, at which the Texas Independent Telephone Association was organized with the following membership:

E. M. Chamberlain, Greenville; C. A. Shock, Sherman; W. H. Johnson, Will's Point; R. T. Riddle, Weatherford; C. W. Roberts, Abilene; E. R. Webber, Orange; W. P. Johnson, Corsicana; F. B. McElroy, Dallas; E. W. Dunaway, Paris; H. C. Schumacker, LaGrange; J. B. Earle, Waco, and Chas. W. Emmer, Beaumont.

The following officers were elected:

President, E. W. Dunaway, Paris; vice presidents, E. R. Webber, Orange; C. W. Roberts, Abilene, and W. P. Johnson, Corsicana; secretary and treasurer, J. B. Earle, Waco.

An investigation of the growth of Independent telephone exchanges throughout the state within the last two years gave evidence of the fact that in almost all towns and cities there are Independent systems in operation, and in many of the small hamlets exchanges composed of both local subscribers and farmer lines are firmly established; in fact, owing to the Independent business being in its infancy and having attained its present strength within a phenomenally short time, the individual owners of Independent exchanges were not generally aware of the developments in territory outside of that covered by their local exchanges. The benefits derived from state organizations in northern states and the need of a combined effort to oppose the common enemy of Independent systems, the Bell company, were considered sufficient reasons for organizing.

Owing to the limited notice given of the meeting many who would have been glad to attend were prevented. Others could not be present on account of the rush of business attending the close of the year. A majority of the leading exchanges in northern Texas and many of the exchanges throughout the southern portion of the state were represented, however. In not a few cases parties who had received no direct notice of the meeting were in attendance, having learned of the same through the Dallas newspapers.

The meeting was called to order by A. A. Miller, who had sent out the notices. Mr. Miller in a short talk referred to the benefits to be derived from the united efforts of the Independent exchanges and the particular need for an association in Texas.

Upon motion, E. W. Dunaway, general manager of the Paris Telephone Company, was elected temporary chairman, and J. B. Earle, secretary of the Texas Telephone Company and general manager of the Brazos Valley Telephone Company, both having headquarters at Waco, was elected secretary.

The president briefly outlined the purpose of the meeting and opened for discussion the question as to whether or not an Independent organization should be formed. Upon motion it was decided to organize an association of the Independent telephone interests. Committees on credentials, constitution and by-laws and permanent organization were appointed by the chair, with instructions to report as soon as possible. The committees retired and while preparing their reports a very interesting address was given by W. J. Maroney. The reports of the committees were then read and adopted.

The association then took up general business and a most enthusiastic meeting resulted. It was found that there was represented at the meeting over 14,000 miles of toll line, and more than 12,500 Independent telephones.

The association determined to confine its active membership to bona fide stockholders in or managers of Independent telephone companies. It was also determined that persons interested in the manufacture or sale of supplies for Independent telephone companies could be eligible to honorary membership. Several gentlemen representing such manufacturing companies were present.

The association passed a resolution pledging its support in securing a franchise for an Independent telephone exchange in the city of Dallas. F. B. McElroy, who has made two unsuccessful applications to the Dallas city council for Independent telephone franchises, said:

"The association will pursue an aggressive campaign, and will see to it that the Independent people receive justice at the hands of the public, even though it is necessary to do so through the legislature of the state. One of the first things the association will do will be to cause a map of all the Independent toll lines of the state to be drafted, and 500 copies will be printed from that draft, and distributed among the various Independent companies.

"Another object of the association will be the bringing about of a complete system of inter-municipal communication and long-distance trunk lines; that is, to build the connecting links between the toll lines that now exist, so as to form a complete chain. The inter-municipal lines mileage of the Independents is twice as large as that of the Bell people, and we propose to bring this fact before the public in our claims for recognition, and justice.

"One thing is certain, we will win out eventually. We are inspired with confidence and are not to be put aside with the rebuttals of one city council. There will be aldermen who will serve in the next council that are not connected with that body at the present time. Every Independent telephone company in the state will join in the fight to secure a franchise in Dallas, and it will only be a matter of time when the franchise will be obtained. I don't know that I shall again apply for a franchise. I have an application for a franchise for a long-distance line at present, and will wait until I see what disposition is to be made of that before taking further steps in the matter."

The meeting adjourned after having passed a motion to hold the next meeting at Fort Worth within sixty days, the exact date to be fixed by the executive committee of the association. The executive committee was authorized by the association to prepare a map of the Independent lines throughout the state and secure data as to the number of telephones in operation.

After adjournment of the meeting, the various members

were entertained by representatives of manufacturers located at Dallas. Following a dinner at the Oriental Hotel, the members in a body attended a performance at the opera house, and later on, through the courtesy of C. W. Hobson of the Duncan-Hobson Electric Company, were entertained at the Elks' club.

The beneficial results of the organization effected cannot be overestimated. The courage of each individual member is strengthened by knowing that every other member is helping to fight his battles. It is predicted for Texas that it will eventually have one of the strongest Independent telephone associations in the United States.

KANSAS INDEPENDENTS TO MEET.

Charles E. Wells, secretary of the Kansas Independent Telephone Association, has sent out the following notice to Independents throughout the state regarding the meeting to be held at Topeka, February 8 and 9:

"The time for our annual meeting approaches. Previous meetings have been held in the month of January, but this year, owing to the difficulty in securing good railroad rates and hotel accommodations, this could only be done by holding the meeting on the last two days of the month. Most of us are very busy at that time, so it was decided as unwise to fix the meeting on those days.

"Excellent rates and hotel accommodations can be secured during the second week of February, and the meeting will be held on February 8 and 9, at Hotel Throop, Topeka. Programme giving full arrangements will be mailed one week before the meeting.

"The successful and almost invaluable results of our efforts in the highway case are an index of what can be accomplished by concerted effort. There are a dozen other matters of great importance that can be as successfully handled as this, and the Independent operators of this association will take action upon them at this meeting. We can get anything we go after if we go together and stick.

"If you believe that unity and concerted action are of value to us, come to the meeting prepared to prove your faith by your works."

The officers of the association are: President, A. A. Godard, Topeka; vice-president, J. M. Doyle, Belleville; treasurer, J. W. Smith, Minneapolis; secretary, C. E. Wells, Marion. Executive committee: A. A. Godard, Topeka; D. K. Rinehard, Holton; J. E. Byers, Ottawa; A. R. Champlin, Newton; W. H. Nelson, Smith Center.

PLAN TO IMPROVE SERVICE IN TWO STATES.

A meeting of the Illinois and Missouri Independent Telephone Association was held at the St. Nicholas hotel, in Springfield, Illinois, on January 12, to discuss plans for the further improvement of the Independent telephone service in southwestern Illinois and the state of Missouri. Representatives of thirty-two companies, which are now affiliated in the organization, were present.

Several new members were admitted to the association and were authorized to establish connections with the companies already represented in the combination. H. D. Stroud of Chicago, representing the American Controller Company, made an address, speaking of the value of the meter service in the operation of telephone plants.

Among those in attendance at the meeting were the following: W. B. Rogers, Waverly; H. G. Conger, Hannibal, Mo.; D. W. Halliday, Jacksonville; W. A. Loehr, Carlinville; F. W. Buffune, Louisiana, Mo.; W. Ray McCaune, St. Louis; E. R. Conklin, Aurora; F. W. Kelly, Springfield; E. D. Boynton, Pleasant Plains; J. W. Mount, Williamsville; U. G. Tucker, Virden; Charles Egan, Petersburg; Ed. S. Glandon, Pittsfield; W. H. Ramsey, Auburn.

Since the last meeting of the association, the companies have completed a number of new long-distance lines. The more important of these are the lines into St. Louis, Bloomington, Joliet, Aurora and Elgin.

OHIO CONVENTION IN MARCH.

The executive committee of the Ohio Independent Telephone Association met at the Chittenden hotel in Columbus, January 11. The meeting was for the purpose of arranging for the annual convention of the association, which will be held in Columbus some time in March. Among those present were: Frank L. Beam, Columbus, president of the association, and the following vice-presidents: J. B. Hoge, Cleveland; W. F. Laubach, Akron; J. B. Rhodes, Zanesville; G. P. Thorpe, Wilmington; W. G. Thompson, Hamilton; J. C. Reber, Dayton; G. H. Metheany, Lima; R. E. Hamblin, Toledo; D. E. Sapp, Mount Vernon.

WEST KENTUCKY AND TENNESSEE TELEPHONE ASSOCIATION ORGANIZED.

At a recent meeting held at Hazel, Kentucky, the West Kentucky and Tennessee Independent Telephone Association was organized. The association at present consists of seven Independent telephone companies, with a total of 320 miles of lines. They are as follows: The Citizens', with 200 miles; the Marshall County, with 75 miles; the Calloway County, with 21 miles; the Lily, with 15 miles; the Valley, with one mile; the Farmers' and the Rural Telephone Company. All of these companies were represented by delegates at the meeting and have made arrangements to extend their lines all over the country. Their lines now reach Sedalia and in a short time will enter Mayfield, where the stockholders of the company will have free communication over the entire system. Capable and reliable business men are at the head of this new association. Dr. W. B. Stokes is the president; B. B. Pullen, secretary, and J. V. Boyd, treasurer, all of Farmington, besides many other good business men are stockholders.

"HELLO GIRLS" IN CONVENTION.

Forty-five young women, all telephone operators, held a convention in Fairmont, West Virginia, recently, in the offices of the F. & M. Telephone Company. The purpose of the convention was the discussion of ways and means to promote and facilitate better service to the patrons of the lines represented. Delegates from Grafton, Clarksburg, Shinnston, Mannington, Philippi, Elkins and Bellington were in attendance. The proceedings were conducted with parliamentary formality, but the chairman's position was one of more or less difficulty, the young women being disposed to talk in season and out.

CENTRAL ILLINOIS INDEPENDENTS ACTIVE.

The Independent telephone men of central Illinois recently held a meeting at Peoria, Illinois. G. H. Glass was elected president of the association. The next meeting will be held April 3 in the new building of the Interstate Telephone Company at Peoria. The purpose of the meeting was to discuss long-distance service.

TO END ENGLISH TELEPHONE MONOPOLY.

It has been officially announced that the British postoffice proposes to exercise its right to buy out the great National Telephone Company the early part of the present year. This action by the government is the first step toward breaking up the monopoly which has shackled and curbed the development of telephones in the United Kingdom. With low rates and quick service the public will be provided with a system such as has heretofore been undreamed of. The postoffice has already provided a system for a great part of London at a charge less than $40, for 90 per cent of its subscribers.

Profits in Independent Securities

WILLIAM CLENDENIN

DO INDEPENDENT telephone securities afford safe and profitable investment? Is the attitude of the banker and capitalist friendly to this form of security? Recently published statistics covering the movement of securities of this nature as contrasted with other public utility forms of investment give an emphatic affirmative to both questions and reveal the cause as well. During the past five years independent telephone stocks and bonds have found ready acceptance in the banking world for various reasons. Primarily because the *control* of these Independent corporations has been lodged almost invariably in the hands of *dependable* men, men known locally and locally appreciated at their proper worth, thoroughly understood and of demonstrated reliability and capability.

This feature of home control as against non-resident holding presents to local bankers, bond investors and stockholders the advantage of accurate knowledge of who and what constitutes the personnel and management of the company, a condition never present and practically impossible where the security issues are put out by great underwriting syndicates supported by names prominent in the directorate to-day but liable to withdrawal to-morrow, and the securities themselves subject to manipulation and speculation at the pleasure of capitalists whose identity remains a mystery and whose purposes may or may not be confined to the welfare of the corporation.

In contradistinction to this, Independent telephone plants are understandable. They are not so vast as to obscure intrinsic specific values. They are not so insignificant as to necessitate a magnifying of those values. More perhaps than any other utility security they represent and enlist the best ability and the highest integrity of the communities empowering and employing them.

There are to-day approximately in the United States 12,000 Independent telephone exchanges and about the same number of Independent companies. The overwhelming majority of these plants are the creations and the creatures of the ablest business men and the most substantial citizens of the towns or cities in which their services are operated. Home control, home location, home support, and home supervision are therefore the basic characteristics of home telephone enterprises; with the natural and well-nigh inevitable result of home confidence and the support of home capital, home bankers, home bondholders and home stockholders. A complete, local, co-operative promotion based upon common interest. The man or woman, therefore, who puts his or her money into this form of investment knows where it goes, can see it in the working and judge its growth, worth and value for himself or herself without relying upon vague reports, prospectuses and the common forms of the literature of exploitation.

Before going into the question of comparative cost, operation and profit, let us note the main features of the telephone as a working economic force in the world. Like railroad companies, water companies, electric light and gas companies, ferries, stockyards, street railway companies, etc., a telephone company is a public utility; but unlike every other public utility, except those in control of water rights, its earnings are not subject to business depression, nor are they subject to the fluctuations in values which move in lines parallel with business conditions. We may cite the official Ohio industrial reports in support of this fact.

The Independent telephone company is, in fact, industrially a law unto itself. It contributes to the conduct and conservation of every line of business; it is dependent upon no one individual interest or group of interests. On the contrary it is supported by all, depended upon by all, and indispensable to all. Herein lies the most unique and remarkable characteristic of telephone properties—its possession of an inherent investment advantage which is directly at variance to that which marks every other utility or public service corporation.

Financial readers of TELEPHONY, and students of investments generally, are familiar with the three accepted measures of utility valuation:

First. The quality of usefulness or the degree of the utility itself; the comparative extent to which the establishment and operation of a utility plant contributes to the working force of the community.

Second. The equality or ratio of price to the share purchased; the relation of the cost of the security to the value of the share it represents.

Third. The estimation in which the property is held; the common judgment and opinion of the people as to its desirability.

Measured by these dominant rules of determining utility valuation, the Independent telephone company stands alone; no other is at all comparable to it. Why? As has been already shown in the clauses immediately preceding, the telephone is a recognized and universal commercial and industrial necessity; not a collateral dependency of any branch or division of commercial activity, but a universal corollary, contributor, tributary and beneficiary of all of them. And again the bond and stock prices of Independent telephone corporations show an equality of ratio between value and price more uniformly even than any other form of investment. A patent reason for this is the real origin and extension of the movement. This came about through *necessity* and not in cupidity. Ninety per cent of the Independent telephone companies doing business to-day were launched, not as money makers, but as means to more rapid and economical conduct of business. That the dividend returns are enormous, as compared with even the most favored forms of safe investment, is and has been not the end sought but the end discovered.

The telephone may be said to be established as a prime factor of commercial intercourse. Though the telephone *field* is as yet scarcely cleared of its big timber—hardly a clearing as yet in sight—the *fact* of the thing is established. There is no doubt about the telephone. It is here. It will be here—always.

The history of the Independent telephone as a company or corporation movement has not as yet, and may never be, collectively and exhaustively written. It is a constant growth. It can be better illustrated than tabulated. The calculations presented in this article are taken at random from reports of individual companies, and the comparative records of groups of companies situated in divisions or districts of the respective states cited in illustration. For instance, there are on record dividend statistics of a group of fifty Independent companies in Iowa, operating 14,780 instruments. Of these companies the lowest dividend declared by any in 1904 was 10 per cent, and the highest 25 per cent, the average earned by the group being 17 per cent. In Michigan the Citizens' Telephone Company of Grand Rapids operates 16,338 telephones in Grand Rapids and in sixty-one towns of the state of Michigan. This company shows a development of service beginning with 832 telephones in 1896, to 16,338 in 1904, as stated, and an increase

of gross earnings from $43,742.05 in 1897 to $343,392.43 in 1904, with a commensurate advance of the dividends *paid,* from $7,737 in 1898 to $112,150.16 in 1904.

Similarly in Indiana, the Home Telephone Company of Elkhart, with assets of $321,142.46, shows gross earnings for 1904 of $36,415.56, five per cent interest on its bond issue in dividends of $6,281.25, and a stock dividend of $9,568.65.

The Delaware & Madison County Telephone Company of Muncie, Indiana, with assets of over $1,000,000, reports operating expenses less than 50 per cent of the gross receipts.

At Logansport, Indiana, the Home Telephone Company, with assets of $282,000, shows annual net receipts of $35,682, a paid dividend of six per cent *on stock,* and in addition thereto a five per cent dividend return upon its issue of bonds.

These cases are typical cases only, taken in typical telephone districts, fairly indicative of the average financial showing of similar average Independent telephone properties of cities and towns throughout the country.

Detailed statistics will be given in articles following the present one, the purpose of this preliminary survey being but a general review and examination of the Independent telephone company generally considered as an investment proposition, from the viewpoint of the banker, the financier and the buyer of safe and conservative public utility securities. Financial interests are inclined to *systematize.* The subject is divisible according to the subject matter of the business. Great banks are compelled to divide and subdivide departments; specialization is, in fact, a condition precedent to successful discounting if not to conservative placement of loans and trust funds. It becomes, therefore, a function proper to the province of financial inquiry to consider *Independent* telephony both in its relation to investment generally, and especially as it may depend or relate to its own natural specific competition.

No well organized, well-conducted, Independent telephone company can be said to be speculative. In fact, no such corporation partakes of the speculative tendency, nor is its basis speculative. It is and has always had a definite investment standing. Local incorporation, popular local support to both stock and service, and the very fact of the multiplicity of stockholders is the best guarantee of this. Again, the speculative element is eliminated by reduction of capitalization to a figure in keeping with the ascertained needs of the enterprise and based upon honest valuation of the specific assets; that valuation in turn determined by actual cost of establishment of the plant and a fair, adequate working capital for operation and extension of the service.

Let us compare these organization *facts,* demonstrated 10,000 times over in the organization of as many prosperous Independent telephone companies, with railway securities, first mortgage public utility bonds of the common sort, etc. Bankers are familiar enough with the frequent interrogation, "How is it that first mortgage bonds of even railroads sometimes become worthless, when they are secured ahead of stock and everything else by a lien on the property?"

There are a great many ways by which first mortgage bonds of the conventional species may become utterly worthless. Some bonds state that they are a first mortgage, while in reality secured only by a second or third mortgage, or by a first *convertible* mortgage, or a first consolidated mortgage, or a divisional mortgage, or a blanket mortgage, or some other "suspired," expired, or improved variety of mortgage, which may be described, collectively, as *qualified* or *contingent* first mortgages. A so-called first mortgage may be only a first mortgage on a small part of a vast property, with a general mortgage on the balance.

Indiscriminate buying and indiscriminate losses on large corporation issues of securities is frequently the result of abuses of this nature, yet Independent telephonic securities have never yet suffered indictment of this character, though even state bonds defaulted reach a total of $310,074,000, including railroad-aid bonds, etc., viz: Minnesota, $5,960,000; Virginia and West Virginia, $72,000,000; Michigan, internal improvement bonds, $5,000,000, etc., etc. In other words, the securities of Independent home telephone companies are so easily within reach of investigation, so easy of comprehension and determination as to constitute an investment class by themselves. They are based upon appreciable values; not inter-dependent but independent; and what is more than all else, the Independent telephone movement is beyond competition. This may appear at first sight a broad and untenable assertion. Let us see. The only competition in the telephone field is that of the American Telephone and Telegraph Company, or the Bell, or the telephone trust, as it is called. But the competition of the trust, and it is an alleged trust only, is a vanishing competition, though strongly entrenched in some of the older cities, say San Francisco, New York and Cincinnati. Progress figures prove this, as to the proportionate number of Bell and Independent telephones in two states:

	Independent.	Bell.
Ohio	145,500	89,000
Indiana	107,000	40,000

Dividends of the Bell company are largely based and dependent upon payments of its licensee companies, such as the Central Union Company of Ohio, Indiana and Illinois. Yet the table given shows the comparative strength of the two movements in two states of the first class. Again, under this licensee arrangement, the licensee companies are compelled to take off the amount of the Bell charges, in addition to what the Independent companies charge, thus placing them at a financial disadvantage in competition with the Independents, with the result that the failure of leading licensee companies is already in evidence. They are unable to carry the double load of dividends to stockholders of the licensee company and the parent trust at one and the same time, as witness the falure, sale and reorganization of the Bell licensee Michigan Telephone Company, in which 743 stockholders lost all, and the Bell company itself, as a stockholder, the sum of $3,687,300, and in all, by loans and in stock, a total of $6,000,000!

It is a frequent source of surprise in financial circles that Bell stock has declined during the past few years in almost exact proportion to the growth of the Independent telephone movement. Thus, in 1902, Bell telephone securities held firm at around 187; 1903 witnessed a decline to 117, and the present price ranging between 114 and 116, or a shrinkage as reported by *Finance* of 27 per cent, or a falling off of $67 per share! According to Moody's classified industrial statistics, page 480, the shrinkage already in American Telephone and Telegraph stock in the three years last past reaches the enormous total of $78,424,780! The capital stock of thirty-six licensee Bell companies issued totals $158,826,400, the public holding through purchases on the New York Stock Exchange, sales recorded, $131,709,300, the Bell company holding individually $27,117,100, upon which it paid in 1888 to 1891, 18 per cent per annum in dividends. In 1892 this rate fell off to 15 per cent; 1894, 16 per cent; 1899, 15 per cent; 1900, *7½ per cent.* Nor has the absorbing company ever exceeded the rate last named.

In further illumination of this condition, monetary authorities note with interest the increased business of Independent manufacturers of telephone supplies and equipment, the advantage in purchase lying with Independents, because they have become *the market.* They have succeeded the trust companies as the largest and most numerous customers, not to mention the work of association organization among Independent companies now rapidly crystallizing into a further emphasis of buying advantage.

And right here has the trust made a mistake, in that it

has charged and continues to charge its stock and bondholders for materials purchased and installed more than twice as much as do Independent companies, with the result that on the trust's books the difference must be made up by general expense or overhead charges or by watered stock. Independent companies are, therefore, in the relative position of buyers at half price so far as the general balance sheet is concerned, which again bears out the disproportionate dividend averages of fifteen to seventeen per cent on Independent securities, as against the 7½ per cent rate paid by the American Telephone and Telegraph Company.

American financial experts have published the facts of comparative capitalization of trust and Independent companies. The showings are overwhelmingly favorable to Independent companies. The tables reveal the fact that Independent capitalization averages one-half less, in proportion to value, than Bell and constituent companies of the American Telephone and Telegraph Company. Figures of Vinton A. Sears in this connection are as follows, though apportioned per instrument:

Capitalization per subscriber (Bell Cos.)	$417
Capitalization per subscriber (Ind.)	146

Close observers of trust methods will not fail to contrast this capitalization of the Bell with that of Standard Oil, which was never a speculative security made to sell. And this suggests the further thought that the Bell people, again unlike the Standard Oil Company, limited and concentrated their operations to congested localities which were immediately profitable, blindly persevering in this mistaken policy until the Independent movement was under way and too far advanced to be headed off. It was the policy of the Standard Oil Company to pacify the public and please the consumer by better oil at a lower price. The Independent telephone movement has in no case departed from the same policy. The administration of the Bell companies has pursued tactics the direct opposite, a policy of greed, insolence and tyranny, with the natural concomitants of public hostility, popular wrath, loss of prestige, falling securities and dwindling rate of dividend.

It is from considerations such as these the change in attitude of banks and bankers toward Independent telephone securities has arisen. The passivity of the financier in years past was not necessarily negative. His is a static, not a dynamic power—up to the point of determination. Appreciation of the enlargement and entrenchment of the Independent telephone movement as an entirety has necessarily preceded the absorption of the securities of its constituent members. Recognition in this instance, as in every other, has gone before subscription. But with the standardizing of methods of telephone construction, the acceptance of governing principles of good engineering practice, the probation period of experiment has passed.

Ten years of successful demonstration has proven to the banker and investor that the operative charges of an Independent telephone company are incalculably less than in any other public utility, and that unlike other industrial properties, such as mercantile, manufacturing, etc., it is not subject to the hazard of fire nor to total or approximate loss therefrom.

The enlargement of Independent perspective from the primitive local natural business of home exchanges through its next step of interurban connection into the ultimate field of long-distance organization is now assured. The formation of state associations and a national Independent telephone association brings out another element of great moment to financial and economic students and is the absence of Independent inter-competition. The success and prosperity of one Independent company does not possess a destructive or nuisance value to any other, but a direct contributive benefit to every other Independent link in the chain, making each stronger by mutual reinforcement, and bringing nearer to realization the long-distance welding of them all. Capitalists have been keenly alive to this unusual investment attribute of Independent properties—their independence, and their inter-independence, both.

The effect is three-fold whether colored by the interests of investor, promoter or service subscriber, namely, the attainment of association without the element of monopoly; efficiency without exclusion; advantage without privilege.

Independent telephone securities are good securities. They are unlike anything else in the security market because they combine the franchise feature with the fact of popularity of service. General business prosperity and the growth of the country *compel* their success, and any fair, capable administration of these Independent telephone corporations will yield a large and yet natural dividend upon a safe and judicious investment.

UNDERGROUND CONSTRUCTION.

A conduit system is being constructed in Camden, New Jersey.

All telephone wires in East Des Moines, Iowa, will be put underground in the spring.

The Citizens' Telephone Company of Waterloo, New York, contemplates putting its wires underground.

An underground conduit system for telephone wires is being constructed at North Tonawanda, New York.

The Santa Monica (Cal.) Home Telephone Company has been granted permission to place its wires underground.

An ordinance for the extension of the underground wiring district has been introduced in the city council of Omaha.

It is anticipated that active work on the underground system of the Mexican Telephone Company in Mexico City will soon be started.

The Home Telephone Company of Crawfordsville, Indiana, has asked permission of the city council to put in an underground system.

The Quincy (Ill.) Automatic Telephone Company is preparing plans for about five miles of underground work, which will be ready about February 1, when proposals will be invited.

An ordinance has been presented to the city council of Detroit, Michigan, requiring that all telephone, telegraph and electric light wires within what is known as the "half-mile circle" shall be placed underground.

In passing on a franchise for the Atlantic Coast Company the city council of Ventnor, New Jersey, made it conditional that the company place all its wires underground within five years after the enactment of the grant.

John L. Horney, proprietor of the Home Telephone Company of Clinton, Indiana, has asked permission of the city council to put in an underground system, the business of the exchange having grown to such an extent that no wire room can be found in the city.

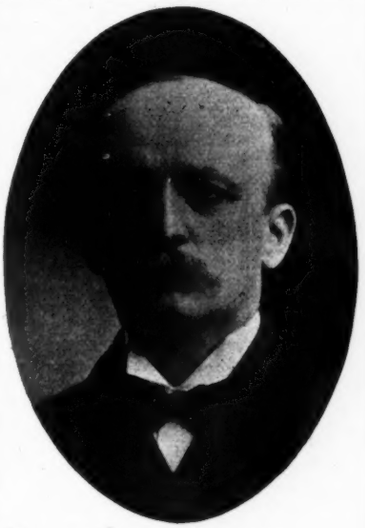
HAT TELEPHONE TO AID THE DEAF.

It has been discovered that a modification of the telephone can be made use of for the purpose of improving the hearing of persons afflicted with deafness. Of recent years inventors have devoted themselves to the construction of instruments of this character in the most convenient form and of such shape that they can be used without attracting unnecessary attention. There has been recently patented in this country, the work of an Australian inventor, an installation of this character which can be stowed away in any ordinary derby hat, the only portion of the apparatus exposed to view being two ear-tubes, which depend from the sides of the hat and repose in the ears. The sound-collecting bells are adroitly concealed in the sides of the hat crown.

Thriving Hoosier State Exchanges

FOLLOWING its annual custom the Home Telephone Company of South Bend, Indiana, one of the leading Independent telephone corporations in the middle west, held its annual reception on New Year's day, throwing open to the inspection of the general public its exchanges at South Bend and Mishawaka, and entertaining as its guests several thousand people in the course of the day.

The buildings were beautified throughout with holly, palms, evergreens, cut flowers and other decorations appropriate to the holiday season. Young ladies were present to look after the visitors and were at their disposal to explain the intricate workings of a modern telephone plant. The exchanges were open for inspection from cellar to garret and those who attended the reception were made to feel that they were welcome.



THEODORE THORWARD.

Open house was observed from 9 in the morning until 9 in the evening. These receptions have grown in popularity each year and many visitors avail themselves of the yearly opportunity afforded by the Home Telephone Company of seeing how busy the young ladies are who answer their calls. There were many people who had never been in a telephone exchange and to them the visit was a rare treat. Those who previously had asserted that the "hello girls" were listening to conversations and having a good time among themselves, instead of answering calls, had an opportunity of learning for themselves the falsity of such statements.

The South Bend Home Telephone Company has experienced a wonderful growth since its establishment in South Bend less than three years ago. In fact the progress made has exceeded the most sanguine expectations of the promoters. The fight to obtain a foothold in South Bend was not a one-sided affair and the entrance of the new company into the field was accompanied by the greatest efforts. Much hard work was necessary and it required many months to arrange the preliminaries which had their culmination in the launching of the new enterprise.

The common council was not friendly to the corporation at the outset, and considerable diplomacy was necessary before the city fathers would give their consent to the granting of a franchise. Petitions for and against a second telephone exchange were presented. It was the consensus of opinion that only one telephone was needed if the proper service were given. The Bell company, which had operated there for years, failed to satisfy the demands of the merchants as to what could be expected relative to future service and rates, and the result was that the knock of the stranger upon the door of the council chamber was finally answered.

All difficulties were gradually overcome and to-day the Home company is meeting with popular approval and deserved success in South Bend. The corporation has endeavored at all times to give the public exactly what it seeks in the matter of telephone service, and this feature, combined with a hearty co-operation of employers and employes, is in a large measure responsible for the success of the company.

The executive board of the Home company recently held a meeting at Fort Wayne, to hear reports for the year, and the showing indicated that the company is doing a large and growing business and is prosperous in a marked degree. Though its system was installed less than three years ago, the company already has 3,200 telephones in service in the cities of South Bend and Mishawaka.

The Home company recently completed the installation of 56,720 feet of aerial cable, to relieve congested lines caused by the building up of several new additions in the outlying districts this season and the heavy demand for telephone service in various parts of the city. The company also installed 20,000 feet of underground cable to give service in several downtown districts where there were more subscribers than cable capacity, and also to connect the aerial cable with the exchange.

The company has experienced a wonderful growth during the past year, as is shown by the new directory that it issued on January 1 that listed 4,000 subscribers in St. Joseph county.

The South Bend system represents the acme of modern construction; its exchange equipment is of the most up-to-date sort, as is all the apparatus required for the operation of the plant.

The financial condition of the Home company is good, having paid 6 per cent per annum on the bonds since the plant has been in operation, 4 per cent per annum on stock and has turned a surplus of $20,000 over to the construction account. The net toll-line income for the past year was over $6,000, which is remarkable considering that the company is hampered by the Michigan Bell cutting it off north at Niles and the Central Union at La Porte, but nevertheless it covers the rest of the territory, having about 500 miles of No. 10 copper wire, which connects it with all the rest of the surrounding counties and also with Michigan City. When Chicago connections are secured, South Bend will be one of the best Independent points in the United States.

Theodore Thorward, president of the Indiana Independent Telephone Association, is general manager of the South Bend Home Telephone Company, and it is due in a large measure to his wide knowledge of the telephone business, coupled with a thorough understanding of the local situation, that the company has experienced such a successful outcome to its endeavors in South Bend and Mishawaka. He is energetic, enterprising, thoroughly alive to the needs of the hour and moment, and, all in all, the right man in the right place.

The officers of the company are: President, Theodore Thorward; first vice-president, M. B. Staley; second vice-president, E. F. Yarnell; secretary, E. R. Stoll; treasurer, M. B. Staley. Directors: George W. Pixley, M. B. Staley, E. F. Yarnelle, W. J. Vesey, C. T. Lindsey, Charles F. Pfeifer, S. M. Foster, D. D. Bates, Theodore Thorward, Elmer R. Stoll, Charles H. Worden, W. E. Mossman, Horace G. Miller, E. W. Cook.

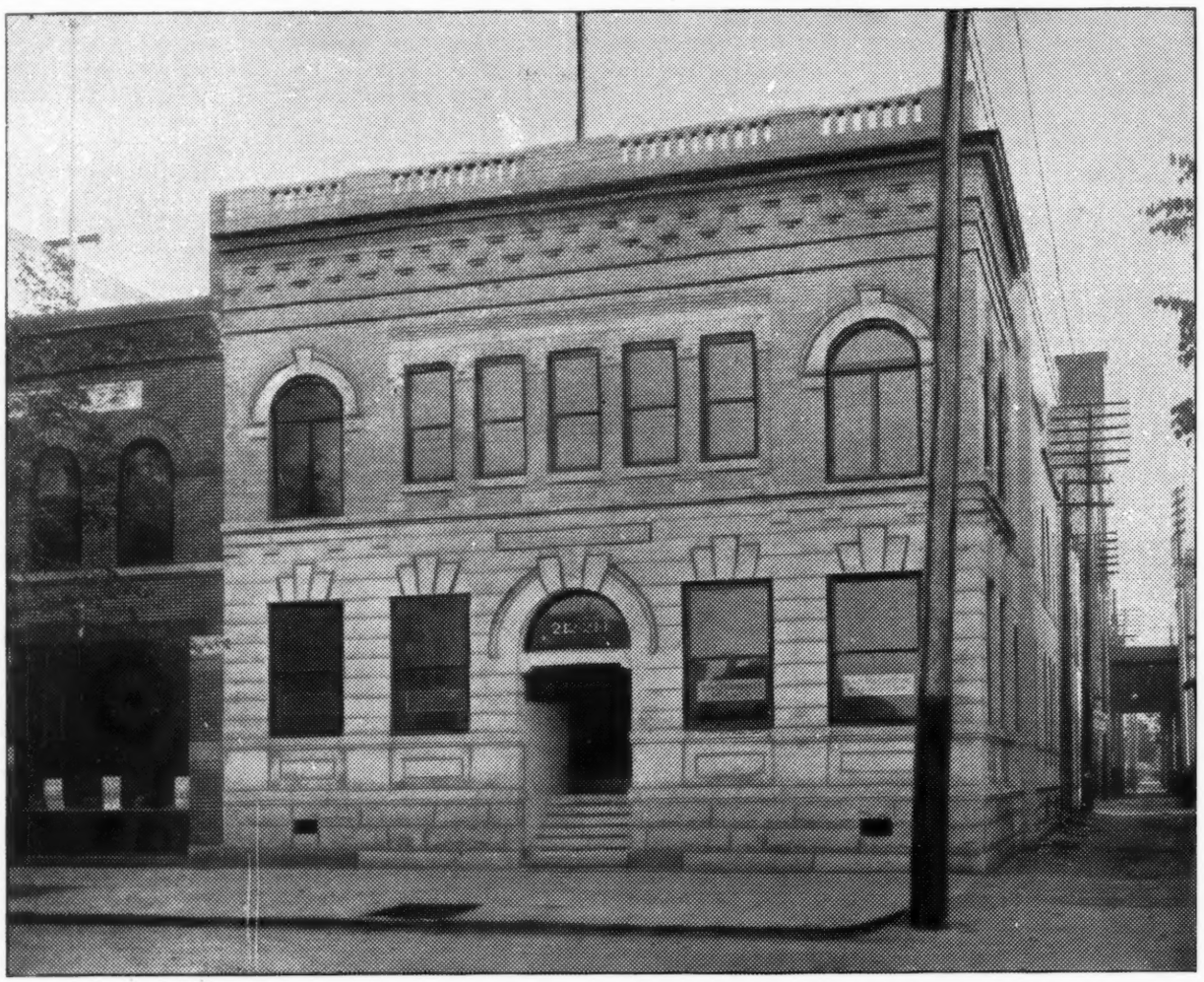
The Home company recently received a communication from the postoffice department at Washington, D. C., stating that it is to be favored with the telephone business at the local postoffice the coming year. The letter is signed by J. J. Hawley, acting first assistant postmaster general, and is as follows:

"Referring to your communication of recent date addressed to the postmaster general, in regard to the telephone service at the South Bend postoffice, I have the honor to advise you that it has been decided to extend patronage to your company, and allowance effective January 1, 1905, has been made accordingly. The postmaster has also been instructed to discontinue service of the Central Union Telephone Company in his office at the close of business December 31, 1904."

What is true relative to the progress of the Home Telephone Company in South Bend is also true throughout the state and country. Indiana to-day, it is claimed, has several thousand more Independent telephones than any other state. The strides made by the Thirteenth congressional district, which a few years ago was, comparatively speaking, unorganized, are almost phenomenal.

Elkhart county has an excellent system. Free service is given between Elkhart and Goshen and other conveniences for subscribers are afforded. The officers of the Home Telephone Company of Elkhart, are as follows: I. O. Wood, president; George D. Lint, vice-president; J. K. Johnston, secretary; H. B. Sykes, treasurer; directors, I. O. Wood, James Kavanagh, Geo. D. Lint, H. B. Sykes, J. A. Arthur, Ed. L. Barber, J. B. Pollard, C. W. Miller and I. W. Short.

The situation in Elkhart is explained by Manager J. K. Johnston as follows: "In 1880 the Bell company opened an exchange with forty subscribers. The rates were $3 per month for residence and $4 for business houses. In 1886 the legislature fixed the limit of rates at $2 per month for residence and $3 for business houses for towns the size of Elkhart. Rather than obey the law the Bell company removed its telephones from the city and closed the office in Elkhart, which was without telephone service for several years. This inconvenience became so burdensome that the business men allowed the Bell company to come back at the old rates of $3 and $4. This rate continued for a number of years. Later a committee of Elkhart business men held a conference with the Bell officials at Indianapolis asking for a reduction in rates. They were treated in an uncivil manner and given to understand by the Bell company that it did not need any suggestion from the people of Elkhart and that it would run the telephone business in that city to suit itself. This resulted in the organization of the Elkhart Telephone Company.

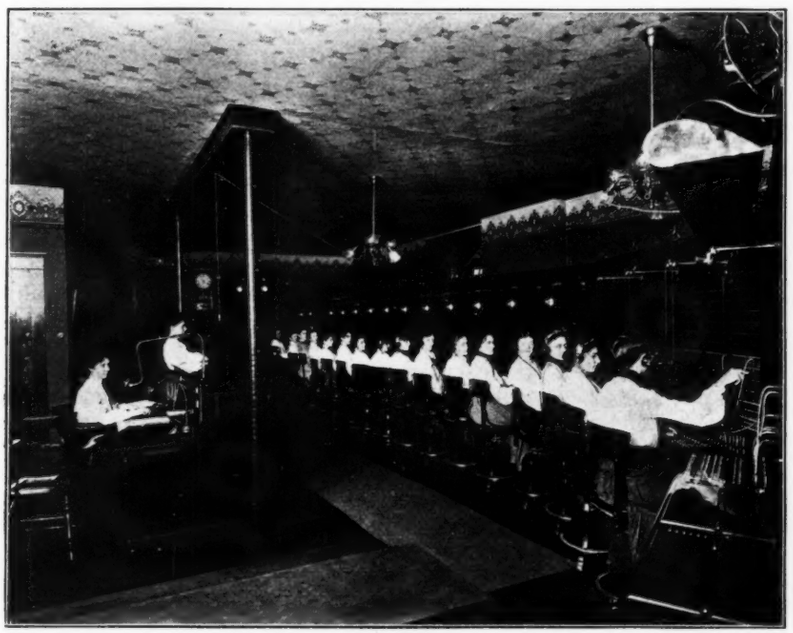


MAIN EXCHANGE BUILDING OF HOME TELEPHONE COMPANY OF SOUTH BEND, INDIANA.

"In 1896 the Elkhart Telephone Company was organized and started operation with seventy-five subscribers. The rates were $1.50 for residence and $2.50 for business houses. In 1896 the Elkhart Telephone Company's list numbered 300 subscribers. The Bell company, seeing that the home company was getting the best of the situation, cut its rates to $1 and $2 with a view of driving out the Home company. In 1898 the Elkhart Telephone Company had a list of 450 subscribers; the Bell 300. At this time the directors of the Elkhart Telephone Company offered to sell the Elkhart plant to the Bell, provided that company would continue to

give telephone service to the people of Elkhart for the same rates as were then being charged by the Elkhart company. This the Bell flatly refused to do, as it did not want to bind itself for an indefinite period to give telephone service at such a low rate.

"In 1900 the Elkhart Telephone Company and the Goshen company consolidated, with a total of 800 subscribers, with free service between Elkhart and Goshen and the county towns which at this time began to build Independent telephone exchanges. The growth of the Independent telephone companies from that time on has been phenomenal. In 1904 the Home Telephone Company of Elkhart furnished its subscribers with free service to over 4,000 telephones in the county, as compared to the Bell, which has less than 400 in the county. The Home company has reduced the toll line rates one-third, in addition to allowing the patrons the use of the line five minutes, as compared with the Bell company's three-minute schedule."



SOUTH BEND EXCHANGE OPERATING ROOM AT 11 A. M.

The Plymouth Independent Telephone Company has entered upon the tenth year of its existence. The franchise under which it is operating was granted on April 16, 1894, to William T. Van Vactor and D. C. Knott, the grant being made upon the condition that the company have telephones in operation within sixty days. When the telephone men set out to secure their subscribers the trouble began. But at last a sufficient number were secured and upon the day of the presidential election, in November, 1894, the system was opened to use. The proprietors then proceeded to build grounded lines to Culver, Argos, Bourbon and Bremen, thus connecting the county seat with all the larger towns in the county.

At that time the company manufactured its own telephone, the Bell company possessing all the patents on the instruments. The latter company served notices on all the users of the telephones, threatening to prosecute them for infringements on their patents. The city council then required Van Vactor and Knott to give a bond of $5,000 to indemnify their subscribers for all loss sustained from such proceedings. The Bell people, however, failed to make good their threats, and the telephones of the Home company were unmolested.

In 1895, C. A. Reeves, the present proprietor, bought the interest of William T. Van Vactor, and assumed control of the office. In June, 1903, Mr. Reeves bought the interest of D. C. Knott and assumed full control.

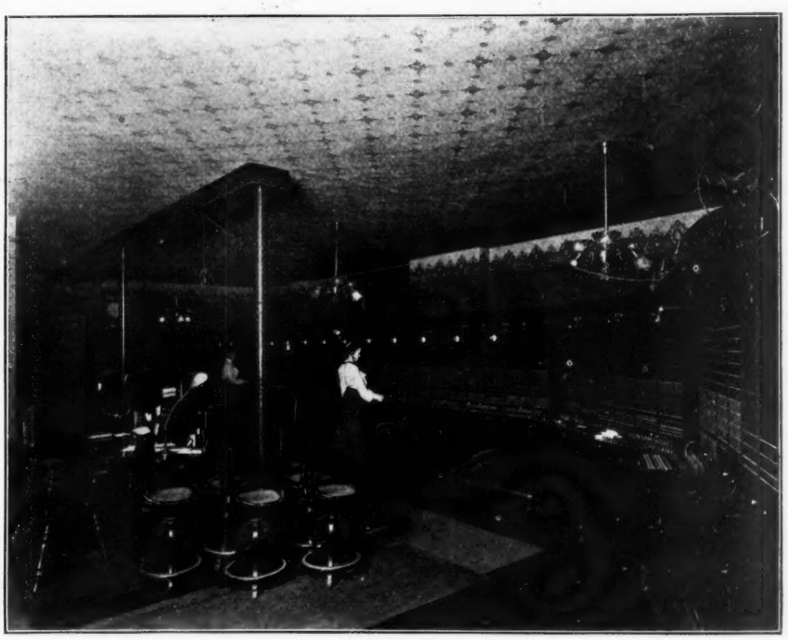
All the toll lines in connection with the office at Plymouth have been repoled, and a metallic circuit of No. 10 wire has been established between Plymouth and Bourbon, by way of Inwood, and to Argos, in addition to a through circuit to Warsaw, Rochester and South Bend, there being two lines to the latter place, one of copper and the other of iron. Mr. Reeves has closed a twenty-five year contract with all the adjoining county seats, to connect them with trunk lines, and to build lines between them and small local towns, giving two circuits in every direction from Plymouth.

The subscribers of the Plymouth office are now able to reach every town in the state of Indiana, southern Michigan and western Ohio with prospects of connections with Chicago in the near future. Mr. Reeves reports that it is almost impossible to place telephones as fast as ordered, there being calls for them continually. Much of the credit for the success of the enterprise is due to Dr. D. C. Knott, but the ruling power has ever been Mr. Reeves, he having devoted all his time to the advancement of the business since he became connected with it nine years ago.

The Independent telephones in the Thirteenth congressional district of Indiana, by counties, are as follows:

ST. JOSEPH COUNTY.

South Bend exchange, including rural districts	2,800
Mishawaka exchange	550
New Carlisle exchange	150
Granger exchange	50
River Park exchange	50



SOUTH BEND EXCHANGE OPERATING ROOM AT 11 P. M.

Walkerton exchange	150
North Liberty exchange	100
Klondike exchange	150

ELKHART COUNTY.

Elkhart exchange	1,500
Goshen exchange	800

Wakarusa exchange	250
Nappanee exchange	300
Dunlaps exchange	250
New Paris exchange	250
Middlebury exchange	206
Millersburg exchange	226
Bonneyville pay-station	1
Bristol exchange	150
Union exchange	50
Pullman exchange	50

MARSHALL COUNTY.

Plymouth exchange	375
Bourbon exchange	180
Argos exchange	200
Bremen exchange	160
Tippecanoe exchange	40
Culver pay-station	3
Donaldson pay-station	1
Hibberd pay-station	1
Burr Oak pay-station	1
Inwood pay-station	2

BRANCH EXCHANGE BUILDING AT MISHAWAKA.

FULTON COUNTY.

Rochester exchange	500
Kewanna exchange	250
Big Foot exchange	100
Akron exchange	100
Fulton exchange	50
Germany pay-station	1
Leiters pay-station	1
DeLong pay-station	1
Tiosa pay-station	1
Talma pay-station	1
Athens pay-station	1
Grass Creek pay-station	1
Blue Grass pay-station	1
Bruce Lake pay-station	1

STARKE COUNTY.

Knox exchange	154
Hamlet exchange	35
Bass Lake exchange	19
North Judson exchange	50
San Pierre exchange	20
Angler's Lake pay-station	1
Grover Town pay-station	1

PULASKI COUNTY.

Star City exchange	10
Winamac exchange	250
Francesville exchange	150
Medaryville exchange	150
Ora pay-station	1
Ripley pay-station	1
Denham pay-station	1
Beardstown pay-station	1
Pulaski pay-station	1
Lowton pay-station	1
Thornhope pay-station	1
Morseburg pay-station	1

KOSCIUSKO COUNTY.

Warsaw exchange	600
Milford exchange	300
Eatna Green exchange	300
Silver Lake exchange	600
Syracuse exchange	250
North Webster exchange	50

TELEPHONE SERVICE IN LOS ANGELES.

The Los Angeles *Times* says that, generally speaking, "the telephone is far more commonly used in Los Angeles than in any other city in the United States. The Home company has about 18,000 telephones connected, 3,500 of these being automatic instruments, and the opposition company has about the same number of telephones, making a total of 36,000 connections in a city of 160,000 population. Compare this with, say, Kansas City, which may be taken as a representative business community in the middle west, while its population is three times as great as that of Los Angeles. Its installation of telephones falls under 10,000.

"Cheap rates and unlimited service have proved the secrets of popularity in Los Angeles. The business rate varies from $3 up to $8 per month, the residence rate from $1.50 to $2.50 per month, and in both cases unlimited switching is allowed, there being no restriction whatever in the number of calls. At these rates even the wage earner finds it an economy to have a telephone in his home, for Los Angeles, with its many suburbs, is a widely-spread city, and the saving of a few car fares, not to speak of the saving of time, soon pays the rental of the instrument.

"The long-distance system is well developed, the Home company having wires to most of the important towns in southern California. Here, again, the rates are favorable to large usage. In the east the charge is usually based on a time limit of a three minutes' conversation. But in California the schedule is cut down so as to allow a fifteen seconds' rate between cities, for experience has proved that this brief time suffices for the placing of an order, the confirmation of a letter, and similar business requirements. So for fifty cents messages can be exchanged over a distance of 500 miles, being thirty cents cheaper than the lowest charge for telegram and answer. This is the cheapest long-distance telephone service in the world."

GRAND RAPIDS COMPANY PROSPEROUS.

At the last regular monthly meeting of the Citizens' Telephone Company of Grand Rapids, Michigan, held in January, the thirtieth consecutive quarterly dividend of two per cent was declared. The year 1904 was the most remarkable in the history of the company and in the growth of the Grand Rapids exchange, which now has 6,200 telephones in use. The list of telephones on the local exchange now numbers 6,043, a net addition of over 1,000 during the year. A considerable element of this growth was made during the last quarter, when 468 orders for service were received. Reports of a similar character were received from the sixty-eight exchanges of the company, and from Jackson, Lansing, Cadillac and Traverse City in particular. In Cadillac every business house of importance has removed the Bell telephone and installed the Citizens'. The directors approved the purchase of the Marion, Michigan, exchange. The new copper toll lines to Boon and Henrietta have just been opened and repairs to the Cadillac toll line completed. The new copper toll line to Allegan was also completed the first of the month.

There are 100,000 Independent telephones in Pennsylvania, and 5,000 miles of trunk lines, representing $50,000,000 to $75,000,000 capital.

DIGEST OF TELEPHONE LITERATURE

Conducted by Samuel G. McMeen.

Concerning Telephone Switchboards—McMeen.—*Telephony, January.*

A description of two forms of common battery switchboards, one having a line relay permanently bridged upon the line and with an equipment of lamp signals in which the line lamp is put out by the supervisory lamp shunting it. Current for speech is furnished to the station through the line relay only, and the cord circuits contain no means of delivering current. The other form is adapted for use in small exchanges and has no lamp signals. Current for transmitters is furnished through the windings of supervisory signals, and these are bridged across the cord circuit.

EQUIPMENT.

Local Cables—Fricke.—*Telephony, January.*

In connecting together various groups of apparatus forming part of switchboard sections it is frequently necessary to make the cables from insulated wire. This is done by making a drawing of the required cable on a board and running the wires one at a time, or one pair at a time, around nails or hooks until the required number have been laced into place. The whole form is then sewed up and finished with shellac. Where a cable is likely to be rubbed, as would be the case in cabling a key shelf, friction tape should be wrapped about that part. Where currents, such as those for ringing, are carried through cables having talking conductors in them, rubber-covered wire is best for the purpose.

More Powerful Telephone Transmitters—Adams-Randall.—*Telephony, January.*

A description of a transmitter having a plurality of carbon buttons, each of which is provided with a single primary circuit, this in turn being associated with one secondary circuit.

The Telephone—Taylor.—*Sound Waves, January.*

The twelfth article of a series, and deals with cord troubles. Every switchboard should be provided with simple arrangements for the convenient and ready testing of cords at frequent intervals. Most of the breaking of cords takes place immediately back of the plug and whenever a grating or scratching sound is heard under test the cords should be cut off just back of the plug and refitted. Care must be taken that the cord is fastened on the body of the plug in such a way that the covering of the cord and not the conductors in it will bear the strain of use. In wiring keyboards, generator wires should be carried in such a way as to free them from any danger of causing induction or conduction disturbances in the talking circuits. The article also contains instructions in regard to the care of gravity batteries. The principal requirement is that the specific gravity of the upper, or zinc solution, should be kept low enough. As the density of this solution tends to rise as the cell is used, some of it must be drawn off from time to time and its bulk replaced with pure water. This must be done without disturbing the blue solution below. The zincs should be cleaned from time to time. No acid or other soldering flux other than resin should be used about a switchboard under any circumstances.

Telephone Stations with Telephone Alarms—Gradenwitz.—*Telephone Magazine, Jan.*

This refers to devices adapted for receiving alternating currents and making a call for the subscriber without the use of bells. An electric automatic device substituted for the ringer gives out a loud tone.

An Electrolytic Telephone—Gradenwitz.—*Telephone Magazine, January.*

Ruhmer, the inventor of a successful form of speaking by means of a beam of light, has arranged a glass vessel containing an acid solution in which he terminates, in electrodes of unequal size, the ends of telephone circuit. When these currents pass between the electrodes, the received speech may be heard by listening with phonograph tubes to the air space above the liquid.

Telephone Protective Devices—Scott.—*Electricity, January 4.*

The first installment of a serial. It has been shown that lightning or other discharges at high potential consist of a large number of oscillatory surges. For this reason the impedance of the circuit through which a lightning discharge may be carried to earth must be kept as small as possible. This phase of protective matters is well described by the author. Several of the earlier forms of arresters are described and illustrated.

Telephone Protective Devices—Scott.—*Electricity, January 11.*

The second installment of a serial. Several earlier devices used to unlatch a trigger are illustrated, leading on to more modern forms of fuses, enclosed and open, and the more highly organized fuses associated with heat coils and open-space cut-outs. Several systems of apparatus designed to protect telephone instruments at subscribers' stations are illustrated by cuts.

Latest Features of Automatic Telephony—Mead.—*World and Engineer, December 31.*

A description, in considerable detail, of a 10,000 line Strowger automatic system. There are nine drawings illustrating the power apparatus, substation circuits and switch circuits on the bridging plan. With this arrangement of switch circuits, a subscriber is not compelled to talk through a large number of relay windings, as has formerly been the case. A number of advantages of operation result from the changes that have been made. There are fewer opportunities for a called subscriber being hung up. A study of these drawings and this description should increase anyone's knowledge of the automatic system.

The Construction of Receiver Holders—McMann.—*Telephone Journal, December 31.*

The things described are devices for holding the telephone receiver of an ordinary type so that both hands are free for doing other things. The illustrations and description are of sufficient exactness to enable one to reproduce either of the types shown.

Operators' Circuits—Electricity, London, January 6.

An illustrated description of the circuits involved in an arrangement enabling two or more switchboard positions to be connected together during idle hours, so that one operator may do the work of both positions.

The Accumulator in Telephone Work—Higgins.—*Sound Waves, January.*

Storage batteries are of distinct advantage in private branch and private exchanges as well as in central offices proper. The power necessary for private branch exchange systems may be stored in an accumulator by means of connections with the lighting system, or may be sent from the central office over special supply wires, or may be sent from the central office over the regular trunk lines during the time they are not required for conversation. The special supply wires may even be used to furnish the power without the use of a storage battery at the local exchange at all. Condensers bridged across these supply wires will prevent the existence of undesirable cross talk. The author gives pointers with reference to the installation of condensers and the exercise of greater care in switchboard assembly.

Telephony in 1904—Electrical Review—January 14.

FINANCE AND ECONOMICS.

Statistics for 1904 give the number of Independent subscribers in the United States as 2,500,000 and those of the Bell company at 2,000,000. The number of telephone messages transmitted by both interests together is estimated at 18,000 per minute. The development of the telephone in the United States still remains much greater than in any other country in the world, and more new uses of the service are being developed here than elsewhere.

Telephony in 1904—Electrical Review—January 14.

An annual casting up of the influence which telephone service is having upon social and commercial life. Some interesting comparisons are given with reference to the relative amount of time consumed in getting a telephone connection in comparison to the time of getting attention in a department store, or from getting from one floor of a building to another in an elevator, and other ordinary things. Some comment is given to the etiquette of the telephone and as to the use of telephone service in warfare. A note records satisfactory progress in the use of the Pupin loading system to long-distance lines.

The Romance of Independent Telephony—WEGNER.—*Telephone Magazine, January.*

Something of a historical treatment of telephonic occurrences, tracing the progress of a number of individuals today prominent in one branch or another of the art.

Independent Telephone People Must Educate—Finance, January 14.

The prejudice which still exists to a high degree in reference to Independent telephone securities has much to do with the successful handling of new enterprises of that character. It is a hopeful sign of the future that this prejudice is being recognized and being made of educational value to the national character. When it is remembered that the effort of the Bell company can be a united one, and judged by its method is unscrupulous, the attitude which must be taken by Independent manufacturers and operators should be unmistakable. With such a host of interested and competent business men in Independent telephony, there is no reasonable excuse why the investing public should remain in ignorance of Independent financial facts.

Increased Use of the Telephone—WEBB.—*Electrical Age—December.*

TRAFFIC AND OPERATING.

In large cities the increase in telephone traffic is greater than in the increase of telephone lines entering the central office. This is most largely due to the fact that more and more stations are being gathered into private branch exchanges, the trunk lines from which are worked at a higher rate and at a higher efficiency than when they served as individual lines. In Chicago, for instance, one department store is equipped with a private exchange system quite as complete and complicated in mechanism as many exchanges serving an entire community of several thousand people. The stations of this department store system serve the purpose of carrying on the business of the store, as well as providing ample facilities for the use of the public on the coin basis. During a recent street car strike a tremendous amount of business of a retail character was conducted over the telephone. Many shoppers learned the convenience of the telephone in this connection for the first time then, and since there has been a notable increase in the amount of such traffic. A large dry goods store in Toledo received five hundred calls on a special sale day, as against one hundred and fourteen calls on an ordinary day. Many inter-urban railways are equipping their systems with the telephone for train handling. In this form of service the telephone may be said to have displaced the telegraph, for it has filled one of the opportunities which otherwise the telegraph would have taken up. In a larger and larger way, too, city car service is being handled by telephone. The police department of the city of New York is a large telephone customer and has perhaps the highest salaried telephone operators in the world. It is said that the percentage of the fire calls turned in to the fire department of various cities by telephone has become an increasing proportion of the total number of alarms. The private branch exchange system of the Treasury Department in Washington has nearly one hundred stations. It has become quite customary to equip ocean steamers with private exchanges, but in this instance it is obvious that connection through a central office over trunk lines is only possible while the vessel is in port. The railroads have at last availed themselves of the advantage of telephone service, and it is likely they will be heavier users hereafter. Apartment houses are beginning to furnish a telephone in each suite, and a convenience therein is that one may communicate with the janitor without any inconvenience.

A Study in Traffic—Telephone Journal—December 24.

There is a striking difference between the distribution of the telephone business of a day in large exchanges and that in smaller and medium sized ones. In small cities the activity of the day begins earlier, and the ratio between the busy hour and the whole day is generally a smaller fraction. The curves of traffic in this article indicate that most of the people in such towns stop promptly for the noonday meal at twelve o'clock. This installment contains an interesting analysis of a load diagram of a large city reduced to calls per line. Three curves for this city show the relative rates of calling in the business center, the residence district and the outskirts. Traffic records such as this form the only basis from which accurate operating management and equipment design can be directed.

A Study in Traffic—Telephone Journal, January 14.

One of the important facts which is developed by a study of daily telephone traffic loads is that the number of calls handled in the busiest hour of the day bears a certain quite constant relation to the number handled in the entire day. Roughly speaking, this ratio is about one to eight, although it varies among different towns. A chief value of the making and recording of counts of calls is to enable the office manager to distribute the work evenly among the different positions. Examples of the records show just what is required to be done in certain conditions to accomplish this equalization. Another curve illustrates vividly the peculiarity of telephone plants, in that they have no inertia. It is a comment of the author of the article that three-second service is rarely obtained with uniformity. Five-second service is much more common and eight-second service during the busy hour is not uncommon. Team work is a solution of the difficulty of special rushes, and by proper training of the operators in this regard the best results which are possible with manual equipment may be secured.

Views on Measured Telephone Service—STROUD.—*Telephony—January.*

In a rather extended comment on the flat rate and measured rate of charging for telephone service, the author recites that in four years the Chicago Telephone system has grown from 23,000 to 116,000 stations. It is said that in New York about the same experience has been met. The reason for the growth is assigned in the change of the method in charging for the service.

New York City Telephone Service—Electrical Review, January 14.

A digest of an article in the *St. James Gazette* of London. A comparison is made of the telephone service of London, Paris, Madrid and New York. In all comparisons as to amount and excellence of the service the comments are all favorable to America. London, with three times the population of New York proper, has about two-thirds as many telephones, and these are operated for London by two systems. Reducing the number of telephones to population, London has only one-fifth the development. In Paris the system is out of date and unsatisfactory. In Madrid, with 600,000 inhabitants, there are but 2,300 telephones in service.

A Study in Traffic—Telephone Journal, January 7.

A further installment of the serial. It is brought out distinctly in this installment that the necessity of doing special things in connection with party line switching reduces the ability of a subscriber's operator. The number of connections which a party line operator can complete in a day lies between the number which can be performed by an operator working on flat rate individual lines and one working on measured service individual lines. It is also noted, and if it is true the fact is interesting, that on party lines the rate of calls is more evenly distributed during the day so that the traffic during the busy hour is a smaller fraction of the traffic of the day. This is not easy to explain. The article contains curves and notes upon trunk line loads.

Telephone Service—Telephone Journal, January 7

An installment of a review of a book of this title by Mr. Herbert Laws Webb. Much of the earlier part of the book is historical and is of advantage in setting down the conditions which have led up to the present large telephonic developments of the country, and in recording what has been accomplished up to the present time. The reason for a very general belief in unfairness in telephone rates is that they have been based upon a wrong principle. The proper unit of charge is the telephone message. With this as a basis, an elastic tariff can be compiled, which will contain moderate figures for small users and will remove the injustice of requiring all to pay alike.

Telephone Service—Telephone Journal, January 14.

A review of Mr. Webb's book under this title, continued from the previous issue.

How a Telephone Line is Built—Telephony—January.

A well illustrated description of the routine life of a telephone construction party working in a rough, hilly region. The scope of the article covers all parts of the work, from the selection of the route and detail engineering of the project through to the completion of the circuits. Such a crew as this carries its own outfit of cooking, dining and sleeping tents, and is in a large way independent of the country through which it travels.

LINES AND CONSTRUCTION.

Hints on Rural Line Construction—PRICE.—*Telephone Journal, January 14.*

An installment of a serial. Special methods are necessary to support poles and braces in marshy and very soft ground. Platforms of timber under the bottoms of the poles are an assistance in this regard. Two illustrations cover this point and that of setting guy stubs and anchors.

Future Pole Supplies—DOBBS.—*Sound Waves, January.*

It is true that the available supply of suitable cedar and similar poles is diminishing. The author believes that action on the part of state legislatures is necessary for the preservation of forestry, if for no other reason than the protection of the future interests of electrical companies. He assumes that at the present rate of consumption the Michigan, Wisconsin and Minnesota pole supply will be exhausted in ten years. He does not believe there is a possibility of a cedar forest which has been cut renewing its growth again. In Canada the supply of pole timber is being looked after with more paternalism, and the destruction is not so great.

Preserving Telephone Poles—Telephone Magazine, January.

The growing anxiety of pole users in reference to the exhaustion of the country's supply of suitable material for poles is causing a renewal of interest in methods of treating the wood of poles in such a way as to lengthen their life. As the decay to which wood is subject is capable of being controlled by the use of antiseptics and it is well known that creosote is a successful material for this purpose, a very great increase in the life of the pole is shown to be possible by saturating the pole with creosote at the point which will be the ground line when the poles are set.

How Telephone Poles Are Set—Telephone Magazine, January.

A comparison showing the striking differences of the old method of setting poles by means of pikes and the more modern way of using a derrick equipped with wheels and easily transported from place to place. The saving in time is so great that a continuous use in one case resulted in a saving of $20 a day.

Transposition of Electrical Conductors—FOWLE.—*Transactions American Institute Electrical Engineers, January.*

Telephone lines of other than very short lengths require to be transposed in order to prevent mutual disturbances among the lines themselves and disturbances caused by other electric circuits in the neighborhood. Careful planning in advance is necessary to prepare a system of transpositions which will be continually satisfactory when the number of transposition becomes quite great. This paper develops a system of transpositions up to fifteen circuits, the smallest circuit being one-sixteenth of the largest unit. The methods of treating special exposures and of testing their sufficiency of transposition are disclosed as well as the details of actually transposing the wires on the pins.

The Conduit System of the City of Erie, Penn.—BRIGGS.—*Municipal Engineering, Jan.*

This city undertook to provide a conduit system and then to compel the removal of overhead wires, and after the project was upheld by the Supreme court, work was begun in 1898. Nearly 200,000 feet of duct are in place, and the cost has been about $22,000. So far the maintenance expense has been very small. A rental rate of five cents per duct foot per annum is charged, and this includes free use of the distributing poles. Less than one-third of the conduit system is now occupied. The cost of the completed system varied from 7.8 cents per foot up to 11 cents per foot. The cost of the manholes averaged $30.

Hints on Rural Construction—PRICE.—*Telephone Journal, January 7.*

This section deals with the choice and treatment of poles. The material is governed by the locality of use and may be chestnut, cedar, pine or cypress. The conductivity of iron poles is cited as a disadvantage to their use. Where strains are likely to be considerable, poles with a relatively large top diameter should be chosen. The author recommends either ten pin or six-pin arms and decries absolutely the use of four-pin or eight-pin arms. Cross arms will be of much greater life if the timber is saturated with creosote. There is a belief in some quarters that a painted pole will rot out quicker than one that is unpainted. The author reproduces a table of the lengths, diameters and weights of poles. Instructions are given for cutting gains and roofing the tops of poles. This should all be done before the poles are set. Useful instructions for digging, setting and tamping close the section.

Electrolytic Corrosion of Underground Pipes—BEADLE.—*Electrical Review, January 7.*

A study of the subject from the standpoint of electrochemistry. It is confined almost wholly to a discussion of the probabilities of chemical reactions on the soil, and is free from notes with reference to new observations, as well as from conclusions of any character.

English Street Railway Telephones—AMSDEN.—*Telephone Journal, January 14.*

The development of street railway systems in England has lead to the adoption of many American practices in their operation. The telephone is notable among these. The chief object of equipping street railway systems with telephones is to enable the employes operating the cars to communicate with the power house or the offices of the company in case of trouble. The portable telephone equipment of the car is well designed, provided with a substantial carrying case and is adapted to be connected with a terminal jack mounted in a waterproof box upon a pole. Other poles have larger telephone boxes, containing each a telephone equipment. Neither of these arrangements has apparatus for receiving a call. In another outfit carried for the use of

GENERAL.

repair crews is a calling and talking apparatus supplemented by a device for receiving a call.

New System at Somerville, Massachusetts—World and Engineer, December 24.

A description in detail of a new office lately placed in service by the Bell company.

A Trouble Testing Circuit—KNEISEL.—*Telephony, January.*

There are in existence great varieties of circuits for testing telephone lines and in these days of highly complicated central office outfits, requiring a high quality of line condition, circuits for testing are of considerable importance and value. This articles describes and illustrates by drawings a circuit adapted for use with the three-wire system of the Western Electric Company. The plan of the circuit is that of a trunk extending from a jack to a distant trunk plug. A formula is given for the use of the apparatus to measure resistances, and it is described how to locate grounds, make tests for opens and to measure the resistance of a line with the bridge.

A Model Rural System—Telephony, January.

A description, with a map and several photographs, of the system operating throughout Humboldt county, Iowa.

The Automatic Problem—TURNER.—*Telephony, January.*

An analytic article in criticism of Kempster B. Miller's paper, "Automatic versus Manual Telephone Exchanges," read before the International Congress of Electrical Engineers in September. It is the comment of the author that Mr. Miller has failed to solve the problem. Mr. Turner believes that the proper development of automatic systems begins at a semi-automatic point. Another of his conclusions is that if full automatic equipment is the right way of handling the telephone business the Bell company would adopt it. The paper lays down as a requirement that in a large city one, or more than one, may be the number of economical office districts. Further along it is indicated that the use of call-wire trunks is a distinct evil. One must conclude, therefore, that from these premises the only logical result is the arrangement of the proper number of office districts connected together by trunks operated in some system not involving the use of call-wires.

Telephones in Locomotive Cabs—LONG.—*Telephony, January.*

By means of sliding contacts, a telephone in a locomotive is kept in communication with a fixed point, so that the train dispatcher may communicate with the engineer while the train is in motion.

Telephone Service on Railroads—Telegraph Age, January 16.

The Lehigh Valley Railway has just placed in service a long-distance line, 271 miles long, and various parts of the rolling stock are equipped with portable telephone sets.

Extension Circuits—CLAUSEN.—*Sound Waves, January.*

A continuation of a serial on extension circuits at subscribers' stations. Eight additional forms of extensions are illustrated.

Lincoln, Nebraska, Automatic System—Telephone Magazine, January.

A description of the new Independent system just completed. The equipment is for 3,000 lines. The system is that of Strowger company. Stone conduit is used and the cost of the entire plant is said to have been $500,000.

Restaurant Telephones—DEWOLF.—*Telephone Magazine, January.*

To avoid the annoyance of leaving the table to answer a telephone call, restaurants in New York and elsewhere are equipped with line branches to the various tables, and portable telephones which may be connected with these branches when desired.

Wireless Telephony—World & Engineer, January 7.

Under the title, "The Transmission of Electrical Energy Without Wires," Mr. Tesla develops at great length his ideas with reference to the ultimate distribution of intelligence and power. He states that he is now at work upon, and will soon complete, a system which will have a greater working capacity than all of the ocean cables combined, and so far as one may learn by a careful reading of the story, universal telephony is to be possible without further use of the immensely costly equipments which have been built. Communication among the planets is again predicted as one of the useful things he says he is going to accomplish.

Military Telephones—GRADENWITZ.—*Telephone Journal, December 31.*

Portable telephones for use in warfare are multiplying in a remarkable manner. The German army has embarked in the use of telephone conveniences to a considerable degree, and this article describes and illustrates the types of equipments used.

Telephone Engineering—MANSON, LIBBY AND SIMPSON.—*Telephone Journal, Dec. 31.*

The twentieth article of a series and continues the treatment of condensers. This installment relates to the measurement of the insulation of condensers after they have been completed. Insulation resistance may be measured by the means of a voltmeter or of a galvanometer. The illustrations which accompany the article are characterized by their usual clearness and delightfully artistic execution.

Telephone Engineering—MANSON, LIBBY AND SIMPSON.—*Telephone Journal, Dec. 24.*

The twenty-first article of a series, and deals with condensers. It is necessary to test completed condensers roughly to ascertain if they are in general good condition, and then more accurately to determine their capacity and resistance. A slide wire bridge using a telephone for the detecting instrument is recommended for comparing capacities, and the principle is particularly well shown in accompanying illustration. The Wheatstone bridge methods of measuring capacity and insulation resistance are clearly illustrated and explained with the necessary formulæ.

Telephones with High Tension Systems—WHITNEY.—*American Electrician, January.*

In a description of the power system of the American River Electric Company the author describes the precautions used in installing the telephone instruments on the line of the company. The telephone circuits are carried on the same poles as the 11,000 volt transmission circuits, and to guard against the user receiving a shock, the telephone is mounted so that the speaker must stand on a platform insulated from the floor by glass. The line to the instruments is equipped with special long break fuses mounted on slate panels, which themselves are insulated from the wall. A knife switch with a long blade is placed above each fuse so the line can be cut out while the fuse is being replaced. The telephone is located in a specially built concrete booth.

Modern Methods of Clearing Trouble—DAY.—*Telephone Journal, January 7.*

One of the serious problems met in the maintenance of line and substation equipments is the transportation of the repair men from place to place. In California, conditions are particularly favorable for the use of automobiles and the long-distance lines of a company there are patroled in this manner. Special equipment enables the necessary materials and tools to be carried and it is possible to cover seventy-five miles a day on average roads. In Illinois, a gasoline motor-cycle has been used with a success which is not believed even an automobile would permit. This is because the roads are not always satisfactory in Illinois. The fuel cost has been found to be lower than the necessary feed for a horse, and the total expense is claimed to be so little as to effect a saving of $9 per day.

Frank Beeman, a telephone lineman, had an experience near Pawnee, Oklahoma, recently thrilling enough to furnish some imaginative writer the basis for a wild west story for the eastern papers. While stringing wires on a long-distance line, he saw some Indians coming; he went into a patch of timber near by, and was chased from his refuge by a herd of buffalo. Of course the Indians were harmless and the buffalo were in Pawnee Bill's pasture, but those facts might be omitted from the blood-curdling narrative.

National-Interstate Telephone Association

AT Indianapolis, Indiana, on Saturday, January 21, 1905, the committees representing the National Independent Telephone Association of America and the Interstate Independent Telephone Association of America met at the Claypool Hotel and agreed upon a consolidation of interests, the new organization to be known as the National Interstate Telephone Association. A constitution embodying the principal features of both organizations was unanimously adopted, which provides for organizing the various states and districts on a delegate basis, one delegate to be elected by the state or district associations for each ten thousand units (or telephones), except in states where there are no organizations. Any company operating an Independent telephone plant for profit may become a member of the new association by conforming to the requirements laid down in Article X. James B. Hoge, president of the national association, and Theodore Gary, president of the Interstate association, were appointed a committee to arrange all matters of detail pertaining to the new organization. The constitution in full, as adopted at the Indianapolis meeting, is as follows:

ARTICLE I.

The name of this Association shall be the National-Interstate Telephone Association.

ARTICLE II.

The aim and purpose of this association is to cement together in a firmer union all Independent telephone interests in the United States, for the purpose of: First, gathering information and statistics; second, promotion of development in territory not now developed, and protection of existing interests; third, uniformity and standardization; and doing any and all other things that are to the best interests of the members of the Association.

ARTICLE III.

The Association shall maintain permanent headquarters, to be the office and center of the Association, to which all members of state and district associations in good standing with this Association shall have access, both in person and by mail.

ARTICLE IV.

Advisory Board.—The Advisory Board of this Association shall consist of one member from each association affiliated with the same, said member to be named by the state association when it makes application for membership in this Association, and to be thereafter selected by a majority of the delegates attending the annual convention of the Association, each year, prior to the time of electing officers. The President of this Association shall be a member and ex-officio chairman of the Advisory Board.

ARTICLE V.

Officers.—The officers of this Association shall consist of a president, first and second vice-presidents, a secretary, and a treasurer, which latter two offices may be filled by one and the same person.

ARTICLE VI.

Executive Council.—The President shall, within fifteen days after the annual meeting, appoint an Executive Council of eight members, who, with himself, shall constitute a committee of nine, to be known as the Executive Council. The appointments made shall be approved by the two vice-presidents, secretary and treasurer, or a majority thereof, and, in case any appointments shall not be so approved, the President shall appoint some one else agreeable to them to fill the place. The President shall also fill all vacancies in said council within thirty days after they occur, subject to the approval of the majority of the foregoing officers.

ARTICLE VII.

Election of Officers.—The officers herein provided for shall be elected by ballot at the annual meeting each year, and shall serve until their successors are elected and qualified.

ARTICLE VIII.

Committees.—There shall be appointed by the President, within thirty days after the annual meeting, a committee, composed of five members, which shall be known as the Committee on Litigation and Legislation, which shall have charge of all national or general litigation affecting the interests of the Association, and inquire into all legislation that might affect the interests of the Association. The chairman shall appoint such other committees as the Association may from time to time direct; committees other than those appointed when the Association is in convention assembled to be approved by a majority of the other officers, as hereinbefore provided.

ARTICLE IX.

Annual and Special Meetings.—The time and place of holding the annual meeting of this Association shall be fixed by the Executive Council, at least three months in advance, which shall be announced through the telephone journals. Special meetings may be held at such other times and places as the Executive Council may from time to time direct. The call for any such special meetings (stating time, place and objects) shall be mailed, at least fifteen days prior to the time of holding the same, to the president of each state or district organization or local company, members of this body, and no business affecting the general interests of the Association shall be disposed of except as specified in the call.

ARTICLE X.

Membership.—Any state or district organization representing a majority of units in interest in such district of Independent telephones in the United States, of not less than ten thousand units (each unit to consist of either one operating telephone or one circuit mile of toll line), and having subscribed to this Constitution, shall be eligible to membership in this Association, upon an affirmative two-thirds vote of the members present and voting, at any regular or called meeting of the Association; provided, however, that application may be made in the interim between meetings to the Executive Council, who may pass upon such applications; and further provided, that the units represented by any such applicant shall not be represented by any other organization in which they may have membership; and provided, further, that after the state organization is completed in any state (or territory), representing a majority of the Independent telephones or toll lines in such state (or territory), district or local organizations in such states shall not be eligible to separate membership in this Association, except upon the recommendation of the state organization, or when, after direct application to this Association, they may be admitted by an affirmative two-thirds vote of the Association, and in no other way; and provided further, that where there is no local or state organization, any company operating an Independent telephone plant for profit may become a member of this Association by making application and subscribing to the Constitution, subject to the approval of the Association or its Executive Council, as above provided. Membership in this Association, however, shall be contingent upon the payment of assesments levied (as provided in Article XI), which assessments shall in no case be less than five dollars ($5.00) per annum.

ARTICLE XI.

Annual Dues.—The annual dues shall be levied, from time to time, by the Executive Council, through the treasurer, who shall send out the call thirty days before the same is payable, which shall not exceed one cent per unit per annum.

ARTICLE XII.

Representatives.—The several state and district organizations or local companies, members of this Association, shall be represented at the annual or special meetings of the Association by delegates chosen or appointed by said organizations or companies in such manner as may be prescribed by the constitution and by-laws of such members; but the number of delegates so chosen shall not exceed one for each ten thousand units, or a majority fraction thereof, as prescribed in Article X hereof. Local companies having less than ten thousand units shall have such fractional vote as they represent.

ARTICLE XIII.

Quorum.—A majority of all the delegates present and voting, at the annual meetings of this Association, or special meetings thereof, duly called, shall constitute a quorum for the transaction of business.

ARTICLE XIV.

Duties of President.—The President shall preside at all meetings of the Association, Advisory Board and Executive Council, and shall approve and countersign all orders drawn on the treasurer thereof, and shall be the general executive officer of the Association, for the purpose of carrying on the business of the Association; and shall perform such other duties as may be prescribed by this Constitution or the Association.

ARTICLE XV.

Duties of Vice-Presidents.—The duties of the Vice-Presidents shall be to act in their order in the absence of the President, and perform such duties as would devolve upon the president if person-

ally present. They shall act upon appointments made by the President, as heretofore provided, and perform any other duties prescribed by the Constitution of this Association.

ARTICLE XVI.

Duties of Secretary.—The duties of the Secretary shall be to keep the records of this Association and notify all members of any general or special meetings of the same to be held; draw all orders upon the treasurer, after approval by the President and Auditing Committee, and perform such other duties as the Executive Council may require.

ARTICLE XVII.

Duties of Treasurer.—The duties of the Treasurer shall be to collect all moneys from the members of the Association, and to safely keep and pay out the same upon the order of the President, duly approved by the Auditing Committee. He shall also be the custodian of any contracts or other papers, except the records of the proceedings of the Association. He shall give bond of some approved surety company for such an amount as may be required by the Executive Council, said bond to be approved by the Executive Council and paid for by the Association.

ARTICLE XVIII.

Duties of Advisory Board.—The Advisory Board may be called together at any time by the Executive Council, upon ten days' notice, which notice shall specify object and necessity for calling the meeting. A majority shall constitute a quorum for the transaction of business. It shall be their duty to meet at the place of holding the annual convention the day preceding the first session of the convention, at 10 o'clock a. m. At that time they shall appoint a committee of three to audit the books and vouchers of the Association and report their findings to the convention. They shall hear reports of officers and Executive Council, and recommend a policy to be pursued by the Association at its convention.

ARTICLE XIX.

Duties of Executive Council.—The duties of the Executive Council shall be to co-operate with the officers in promoting the interests of the Association. They shall have the right to create the office of assistant to the Secretary or Treasurer, and employ one or more persons to fill these offices, who shall give their entire time to the interests of the Association. They shall appoint an auditing committee of three, whose duty it shall be to audit all bills of the Association before payment is made. They shall fix salaries of all officers and employes, said salaries to cover actual time spent in the interests of the Association. They shall be allowed actual traveling expenses, when on the exclusive business of the Association. They shall assist the officers in doing all things necessary to make the organization a success.

ARTICLE XX.

Members or Officers Ceasing to Be Independent.—Any member or officer becoming in any way connected with other telephone interests than those identified with the Independent companies shall be regarded by the Executive Council as having tendered his resignation to said Association. Any one becoming a member of or accepting an office in this Association does so with the above understanding; and the Executive Council shall, in case of resignation of officers, appoint their successors until the next regular or special meeting of the Association, when the vacancies shall be filled.

ARTICLE XXI.

Committees at Annual Meeting.—The President shall appoint at the first session of the annual meeting the following committees: Committee on Credentials, Committee on Nominations, Committee on Amendents to Constitution.

ARTICLE XXII.

Order of Business.

1. Meeting to be called to order by the President.
2. Reading of the minutes of the last meeting by the Secretary.
3. Report of Officers and Committees.
4. Appointment of Committees, Regular and Special.
5. Programme.
6. Hearing Reports of Committees.
7. Election of Officers.
8. Transaction of Miscellaneous Business.
9. Presentation of New Business.
10. Adjournment.

ARTICLE XXIII.

By-Laws.—The Executive Council may in its discretion adopt such by-laws as it may deem expedient, not inconsistent with this Constitution.

ARTICLE XXIV.

Amendments to Constitution.—This Constitution may be amended at any annual meeting of the Association by an affirmative vote of a majority of the members present, or at any special meeting of which due notice shall have been given, at least thirty days previously, to every member of the Association, when such notice shall specify, among other things, the sections of the Constitution proposed to be amended, and the amendments offered thereto; provided, however, that no amendment shall be made at any annual meeting authorizing the Association to assess more than one cent per unit per annum without giving at least thirty days' written notice of the proposed amendment.

RECENT PUBLICATIONS REVIEWED.

The Telephone Service; Its Past, Present and Future, by Herbert Laws Webb; 118 pages; 6x8; paper cover; freely illustrated; price, one shilling net. Whittaker & Company, 2 Whitehart street, London, 66 Fifth avenue, New York.

The simple fact that Herbert Laws Webb is the author of this little work insures its being a classic in the field it covers, and entertaining, as well as instructive. The author outlines the nature of the book in the introduction in which he says:

> The telephone service has many peculiarities which distinguish it from other public services. Among these the principal is that the customer becomes, to a certain extent, the operator, and for the time during which he uses the telephone, a part of the machine. This results in the customer feeling directly and acutely every difficulty that arises in the working of the service, and it is this fact which is chiefly responsible for the acrimony with which complaints against the telephone service are usually tinged. This acrimonious tone, unfortunately, spreads to the discussions which periodically arise in this country on the broader question of telephones rates and telephone policy generally. Unfortunately, again, these discussions are usually marred by a lack of knowledge on the part of many participants, not alone of the technical details, but of the fundamental principles of an extremely technical industry. In the following pages an endeavor has been made to describe in plain language the general features of a modern city telephone system, and the principles which govern the cost of production of the telephone service. It is hoped that these descriptions will be useful both to the telephone user, as such, and to the reader who is interested in the working and development of that most magical of modern electrical industries—the telephone service.

The keynote of the book is its simplicity. Mr. Webb has couched his language in such plain terms that even the layman can comprehend the meaning of every word and line, and understand just what the author is driving at. The book is divided into ten chapters, covering the workings of the art in a general way, and touching upon the humorous side of the telephone situation, as well as the more serious. The book easily can be read and digested in a couple of hours' time, and the reader, whether he be layman or technician, is sure to enjoy the perusal of it.

The Letter of Petrus Peregrinus on the Magnet, A. D. 1269. Translated by Brother Arnold, M. Sc., Principal of La Salle Institute, Troy; 41 pages; 6½ x 9; cloth bound; illustrated; price, $1.50. McGraw Publishing Company, New York.

This is indeed an unique contribution to literature, and a work that should deeply interest all those engaged in the electrical field, as the Peregrinus letter is one of the earliest known treatises on the magnet. Peregrinus' association with the magnet was the result of his search for a device whereby the mooted problem of perpetual motion might be solved. Peregrinus, be it further known, was the first to assign a definite position to the poles of a lodestone, and to give directions for determining which is north and which is south; he proved that unlike poles attract each other and that similar ones repel; he established by experiment that every fragment of a lodestone, however small, is a complete magnet, thus anticipating one of our fundamental laboratory illustrations of the molecular theory; he recognized that a pole of a magnet may neutralize a weaker one of the same name, and even reverse its polarity; he determined the position of an object by its magnetic bearing as is done to-day in compass surveying.

Electric Conductors, by Frederick A. C. Perrine; 300 pages; 6x9; cloth bound; profusely illustrated; price, $3.50. D. VanNostrand Co., 23 Murray street, New York.

This is perhaps the most comprehensive and thoroughly satisfactory treatise upon this subject which has ever been presented. The writer states in his preface that it represents ten years as a manufacturer of insulated wires and cables, as an engineer advising their installation and as a teacher of electrical engineering. The utmost research and care is evinced on every page.

Factory or Machine Made Cables

W. A. FRICKE.

ARTICLE No. 1 being devoted to "Local or Hand-Made Cables," we will now turn our attention to that of "Factory or Machine-Made Cables," which is equally important. Our first thought in laying out a telephone exchange to be cabled should be the placing of our switchboard cabinets, frames, etc., in such a manner that the cabling between them can be most conveniently and economically run. In doing this, additional cabling will be greatly facilitated and the additional cost to the telephone companies brought to a minimum.

Secondly, we should always lay out floor and cabling plans to allow for the cabling of the ultimate capacity of the exchange. Cables are most satisfactorily run between the switchboards and the frames, or from frame to frame,

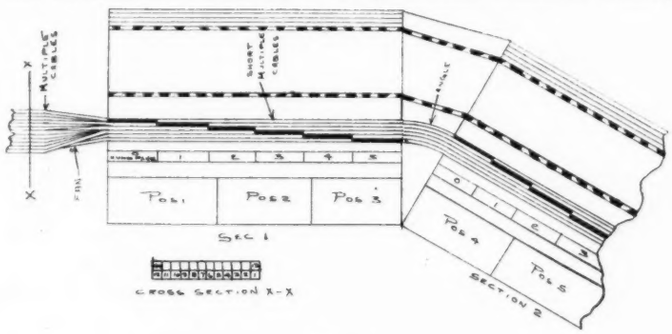


FIG. 1.

when a cable rack is furnished, which can be made of very light but substantial iron work.

Ordinarily when it is desired to run cables under the true floor or under a false floor, it is good policy to provide a cable rack extending from a line of the lower strip of multiple jacks to the floor. Overhead cabling must necessarily be run on some manner of support; the support, of course, should be of such design that the cables can be readily run and sewed or otherwise fastened to the same.

If the terminal frames of an exchange are designed to take, say, 160 lines per upright, all cables leading to the same should be calculated to run in accordance to it, viz., in case you should have, say, twenty-one pair cables to be used in carrying the lines from the multiple jacks (twenty per strip) to an intermediate frame (which we will call

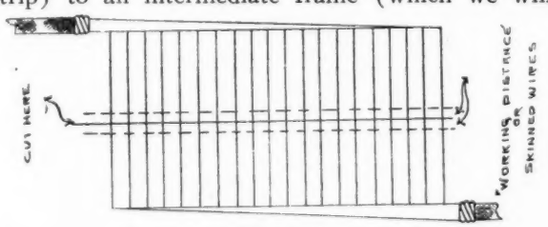


FIG. 2.

multiple cables), you will find it very convenient to fan out the cables just as they leave the sections (as shown in Fig. 1), and after passing through a support such as a cable rack the cables can be made to run in regular order, as shown in the cross section X-X of Fig. 1. A support for these multiple cables after entering the switchboard should always be provided, upon which the cables rest and upon which the short multiple cables (or cables used to multiple the lines from one section to another) are also run (as shown in Fig. 1). The short multiple cables are the only cables which one can safely form out on both ends, as when once figured out you can make a table, which can be used as reference, and on a certain type of switchboard these cables never vary, except where the switchboard sections are placed at an angle (see Fig. 1), and then another table should be made up, including the increase at the angle.

The skinners on both the multiple cables and the short

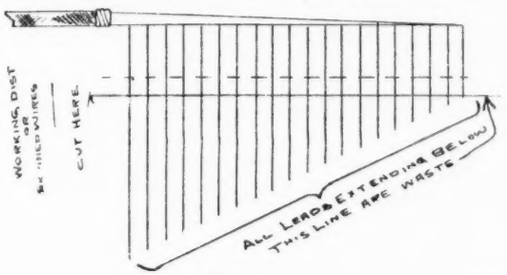


FIG. 3.

multiple cables should be alike and the forms so made that they mesh with one another. The skinners should be left long enough so that the jacks can be taken out for repairs or inspection. The skinners increase or decrease for each panel according to the manner in which the cables enter into the section (see Fig. 1). Some firms run their multiple and short multiple cables in 100-pair cables, and while this makes considerably less cable, it gives it a rather bulky appearance, is harder to handle and more difficult to form, consequently giving more chance for making of transpositions. The Bell company uses a patent form for its short

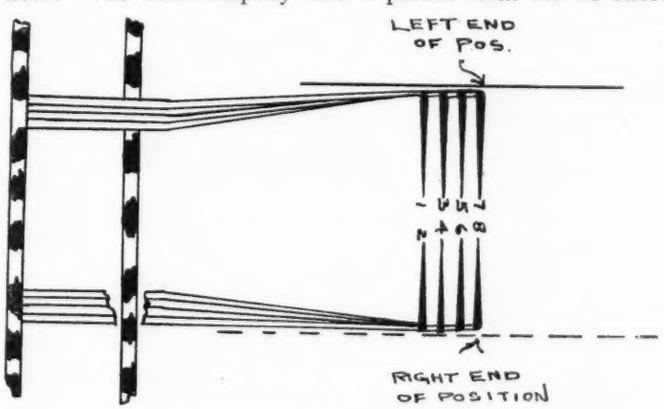


FIG. 4.

multiple cables, which saves considerable cable, as well as time, as shown in Fig. 2, while the Independent companies have to resort to a form as per Fig. 3, which, as shown, wastes considerable cable. All multiple cable and short multiple cable can be sent from the telephone manufacturer's soldered to the multiple jacks, as this can be more satisfactorily and economically done by them, and saves a lot of work in installing the same. However, the multiple cables should not be formed at the frame end and in calculating the cable lengths a little slack should be allowed so that in case something unforeseen should happen, such as a pillar being in the way, miscalculations or wrong information or dimensions received, a little slack left in the cables comes in very handy.

Cables used to wire the answering jacks and lime lamps to the intermediate frame, which we will hereafter term

answering jack cables, are usually sent from the manufacturer's soldered to the jacks and lamps, the skinners on the cables being left long enough to readily take out the jacks or lamps for repairs or inspection, without disturbing any of the other apparatus. These cables are found best to run direct from the jacks and lamps to the floor or into a running box, if the switchboard section be equipped with one; from there they run to the end of the switchboard drop

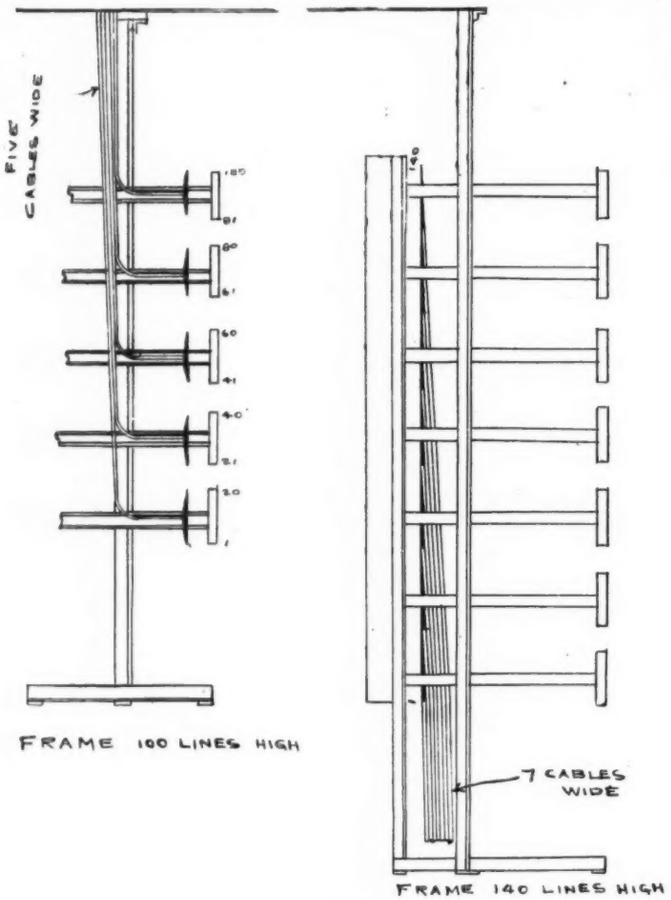


FIG. 5.

either under the true or false floor or are carried overhead (which is the most satisfactory) upon a cable rack, direct to the intermediate frame. Answering jack cables should be formed at one end only, preferably at the jack and lamp end, and are found very satisfactory when brought into place at either end of the position to which they belong. (See Fig. 4.) As in the multiple cables one should arrange them to enter upon or under the frame according to the manner in which the frame is constructed, viz., in case your frames take 100 lines to an upright arrange the cables to run five wide; if 140 lines high run them seven wide, and so on according to the number of lines per upright (see Fig. 5).

Cables between frames, such as between the relay frame and the intermediate distributing frame, or between the relay frame and the main distributing frame, should be laid out very cautiously, as in ordinary practice the relay frame is so constructed that one bay of framework will take as much apparatus as will wire two or three uprights on either the main or intermediate frame, and it can then be readily seen that if the cables are run across the top or under the bottom of the frames, after one bay of relays and two or three uprights (as the case may be) have been laid out for cables, and calculated that for each successive bay of relays and the corresponding uprights of the frames the cables will be identical to those first figured. (See Fig. 6). The above cables, commonly called frame cables, should be formed out on one end only, viz., the end which would be most difficult to form in installing same. In calculating the above cables a few inches of slack should be allowed.

It has been tried and proven a sad failure to form both ends on all cables, except the short multiple cables, as one has to figure too close, which wastes time, and then in case of a miscalculation, which is very likely to happen, or an inch or two short on cutting the cables in the shop, or the cutting off of too much stripper, and other reasons too numerous to mention, it would spoil our whole cable, so it has been found most satisfactory to form one end of the cables only, figure them liberally and allow a few inches of slack. Then when the installer runs his cables he can solder in one end and run his cables to their proper places, then strip, form and solder them in, just where they belong. The forms at the intermediate and main frames can be all laid out like, and by running the cables on a slant the same length of skinners can be used on all cables. (See Fig. 5.) The same applies at the relay rack.

Figure 7 shows the manner in which a few standard

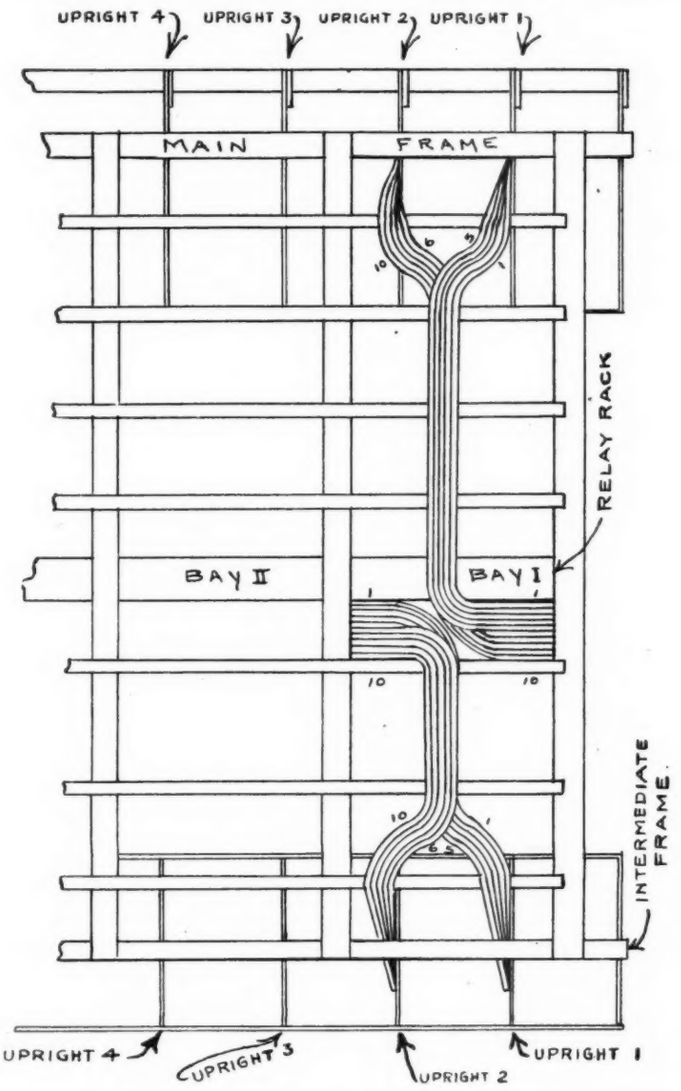


FIG. 6.

forms are laid out. Miscellaneous cables, such as outgoing trunk, incoming trunk, order wire cables, etc., when not used in too great a number are best cut and formed by the installer, and should be sent to the installation in bulk. Figure 8 shows us a cable run containing three curves. The reader can readily see that the distance *A-B* will be the same on all the cables, whereas, the distance *B-C* increases

for every eight cables. A table of curves should be laid out by anyone who has to calculate cables, starting with a quarter turn with a radius of not less than three inches (as cables are not satisfactorily bent on a smaller radius), tak-

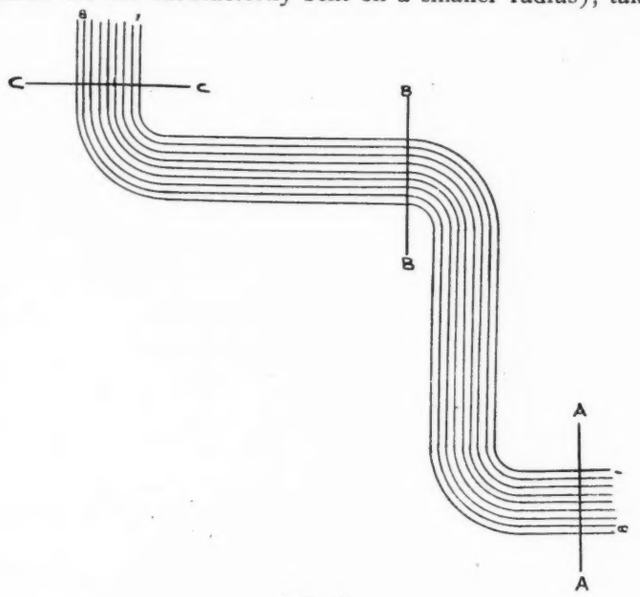


FIG. 7.

ing the different sizes or diameters of cables used and making out the table for about twenty cables wide, as it is a rare case to run cables more than twenty wide.

The spare wire or wires which are found in most cables should be formed out in every form, brought out to the

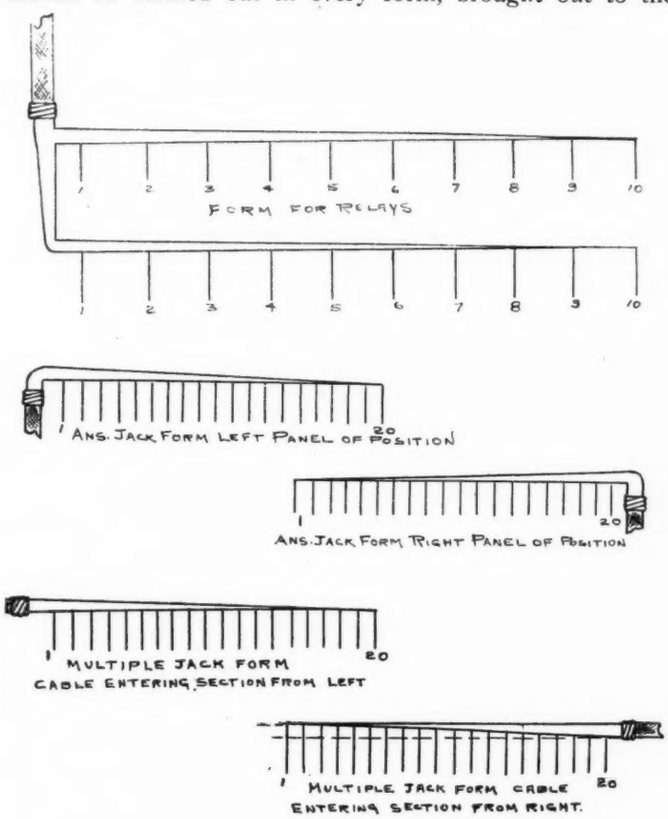

FORM FOR RELAYS
ANS. JACK FORM LEFT PANEL OF POSITION
ANS. JACK FORM RIGHT PANEL OF POSITION
MULTIPLE JACK FORM
CABLE ENTERING SECTION FROM LEFT
MULTIPLE JACK FORM CABLE
ENTERING SECTION FROM RIGHT.

FIG. 8.

furthest end, so that it may be used at any of the skinners should occasion call for it. Do not splice out any forms unless absolutely necessary. Every cable should be tagged on both ends according to the relative position it takes on the switchboard or frame.

Some of the larger telephone manufacturers have regular forms used for the calculation of cables, upon which are columns for laying out cables step by step. Starting at the butt of a cable use one column for all cables to some point convenient, which we might term *A*; another column from *A* to *B* (see Fig. 8), and so on until the other butt or end of the cable is reached. This is commonly called the skeleton sheet. After having totaled up the various columns across simply add enough cable for your stripper or strippers and you have the actual length of the cable to be cut.

Anyone who has figured cables will agree with me on a few of the following "Don'ts":

Don't form both ends of your cables before installing same.

Don't waste time trying to figure down to one-hundredth of an inch.

Don't forget to increase your cables at curves.

Don't vary forms or skinners any more than you can help.

Don't trust your calculations without the addition of a few inches of slack.

The following is a quotation from a well-known telephone engineer: "The closer you figure factory cables the less accurate will be your results." This should not by any means convey to us the idea that we may be shiftless in our calculations, but simply means not to spend unnecessary time, energy and worry by trying to figure down to a hair where it is absolutely unnecessary, which process, of course, on the other hand, is very essential in some engineering feats.

AMAZING GROWTH OF DES MOINES MUTUAL.

At the recent annual meeting of the Mutual Telephone Company of Des Moines, Iowa, the report of the officers showed that the improvements which were planned and largely executed during the past six months, and which include the construction of a complete conduit system in East Des Moines next summer, will amount to not less than $330,000, and possibly more.

The work of cutting in the wires of subscribers to the exchange onto the new switchboard has been completed. With the exception of the work of placing the East Des Moines wires in conduits the improvements which the company inaugurated a year ago are almost complete. The management reported to the stockholders on the East Des Moines proposition. It is the plan to begin work on that part of the improvement as soon as the weather will permit.

The Des Moines Mutual system as improved is one of the most complete in the country. The work has been done by Engineer C. H. Judson of Council Bluffs, who also installed plants for Independent companies at the Twin Cities and Kansas City. Lincoln, Nebraska, Waterloo, Iowa, and many other cities have sent committees to Des Moines to inspect the new plant. In the Mutual's new system the original cost of construction is larger, but the cost of maintenance is less. There are no exposed wires in the system, and the construction is all-cable. This is more costly than the pole construction, but it does away with many expenses afterward.

Officers of the Mutual reported that during the last four months its number of subscribers has increased from 2,350 to about 2,700, and that there are at the present time more than 400 applications for contracts on the books of the company.

Many Pullman cars recently have been equipped with telephones so that passengers may communicate with the porter from their berths and also get connection with long-distance telephones when the train is at a station.

Northwestern Cedarmen's Convention

THE Northwestern Cedarmen's Association, represented by nearly two score of its members, held its ninth annual meeting in the club room of the Hotel Pfister, at Milwaukee, Wisconsin, on Tuesday, January 3. The proceedings were full of interest and marked with enthusiasm, and the convention was pronounced by those present to have been one of the best ever held by the association.

The register of those in attendance included the names of the following:

LIST OF ATTENDANTS.

C. H. Worcester, C. H. Worcester Company, Chicago.
H. S. Gilkey, Pendleton & Gilkey, Minneapolis.
H. W. Reade, Pittsburg & Lake Superior Iron Company, Escanaba, Michigan.
George J. Farnsworth, Bay de Noquet Company, Nahma, Michigan.
W. J. Wagstaff, Oshkosh, Wisconsin.
T. A. Bruett, Wilbur Lumber Company, Milwaukee.
Daniel MacGillis, MacGillis & Gibbs Lumber Company, Milwaukee.
F. N. Snell, Milwaukee.
J. H. Fowler, Fowler-Jacobs Company, Chicago.
E. Elmore, Elmore-Fowler-Jacobs Company, Milwaukee.
E. H. Valentine, Valentine-Clark Company, Chicago.
M. K. Bissell, Erickson & Bissell, Escanaba, Michigan.
R. H. Downing, Bradley-Watkins Company, Minneapolis.
A. T. Naugle, E. E. Naugle Tie Company, Chicago.
W. B. Thomas, White Marble Lime Company, Manistique, Michigan.
Malcolm MacLeod, Oconto Company, Chicago.
F. J. Lang, Wisconsin Land & Lumber Company, Hermansville, Michigan.
J. A. McDevitt, Cloquet Tie & Post Company, Cloquet, Minnesota.
M. H. Coolidge, M. H. Coolidge Company, Minneapolis.
W. G. Hollis, secretary Northwestern Lumbermen's Association, Minneapolis.
H. B. McMeal, TELEPHONY, Chicago.
F. A. Fuller, Morgan Lumber & Cedar Company, Foster City, Michigan.
James O'Callaghan, O. C. Lumber Company, Vulcan, Michigan.
T. M. Partridge, T. M. Partridge Lumber Company, Minneapolis.
W. L. Arnold, Wittenberg Cedar Company, Wittenberg, Wisconsin.
M. Perron, Perronville, Michigan.
Hall L. Brooks, Tomahawk, Wisconsin.
Paul Perrizo, Perrizo & Sons, Daggett, Michigan.
C. J. Huebel, C. J. Huebel & Company, Menominee, Michigan.
George Nicholson, Jr., White Marble Lime Company, Manistique, Michigan.
J. H. Gerich, MacGillis & Gibbs Lumber Company, Milwaukee.
H. M. Dixon, Cloquet Tie & Post Company, Cloquet, Minnesota.
G. H. Bulgrim, R. Connor Company, Marshfield, Wisconsin.
T. M. Wall, Wall-Spaulding Company, Oshkosh, Wisconsin.
A. D. Watson, Raber & Watson, Chicago.
John F. Hayden, secretary, Minneapolis.
William Mueller, William Mueller Company, Chicago.
W. H. Graffis, *Telephone Magazine*, Chicago.

Tuesday forenoon was devoted to a meeting of the board of directors, meetings of standing committees, and mutual greetings and interchange of opinion among the delegates. The formal session was called to order at 2 p. m. in the clubroom by President H. W. Reade of Escanaba, Michigan.

Secretary John F. Hayden of Minneapolis read the minutes of the last annual meeting, which was held at the Auditorium hotel, Chicago, on January 6, 1904, and also the minutes of the special meeting held at the Nicollet hotel, Minneapolis, Tuesday, March 29, 1904. The minutes of both meetings were approved.

President Reade then read his annual address, which was as follows:

This is the ninth annual meeting of this association, but it is the first time Milwaukee has been honored by a similar gathering. No doubt this city has been envious of the towns which have already been favored, and as each annual meeting has come around it has cast longing glances at Menominee, Escanaba, Minneapolis and Chicago. We have all heard from infancy of Milwaukee's fame as an entertainer, and therefore we expected nothing less than that we would be met at the depot by a delegation of prominent citizens, headed by a German band, and escorted to an outdoor garden under the leafless trees, where we would be offered a breakfast consisting of weinerwursts and beer.

However, such was not the case. We were allowed to make our way to the hotel like any ordinary citizen. This was certainly a very frosty reception for so distinguished a company of gentlemen, but we dislike to think that it was through any neglect or discourtesy on the part of the citizens of Milwaukee, but on the other hand, we feel that the fault may lie with two of our own members who are residents of this city and who were appointed a committee on details and given full charge of the arrangements for this meeting. I speak of Messrs. MacGillis and Bruett. I have been informed that Mr. MacGillis got into a wrangle with the citizens' committee because he insisted on having bagpipes instead of the German band and would not give in. As some of us know from experience, when Dan insists the other fellow seldom gets what he wants. As to the beer, or rather to the lack of it, we will have to lay this to the other member of our local committee, as I am told that the citizens decided it would take too long to "Bruett."

The past year has not been as prosperous a one for dealers in cedar products as we anticipated. The invasion of the western shingle and the curtailment of building operations have had their effect upon the shingle market. It is hard matter to account for the falling off in demand for posts during the past season. Although the crops in some sections have not been up to the average, there has been no widespread crop failure and the great majority of farmers in the agricultural districts where we find our market for posts, are in good financial condition. The farmer has, therefore, been in a position to buy posts, provided he needed them, which brings us to the conclusion that the farmers in the older farming states now have their farms fairly well fenced. These farmers were not able during the panic years of 1892 to 1898 to buy posts, and therefore their fences went to wreck and ruin, but when fortune smiled again on the western farmer he bought our posts at fancy prices, repaired his old fences and built new. This great demand for posts brought forth an immense output during the past few years, which, on account of the lighter demand, has caused a surplus for the present year.

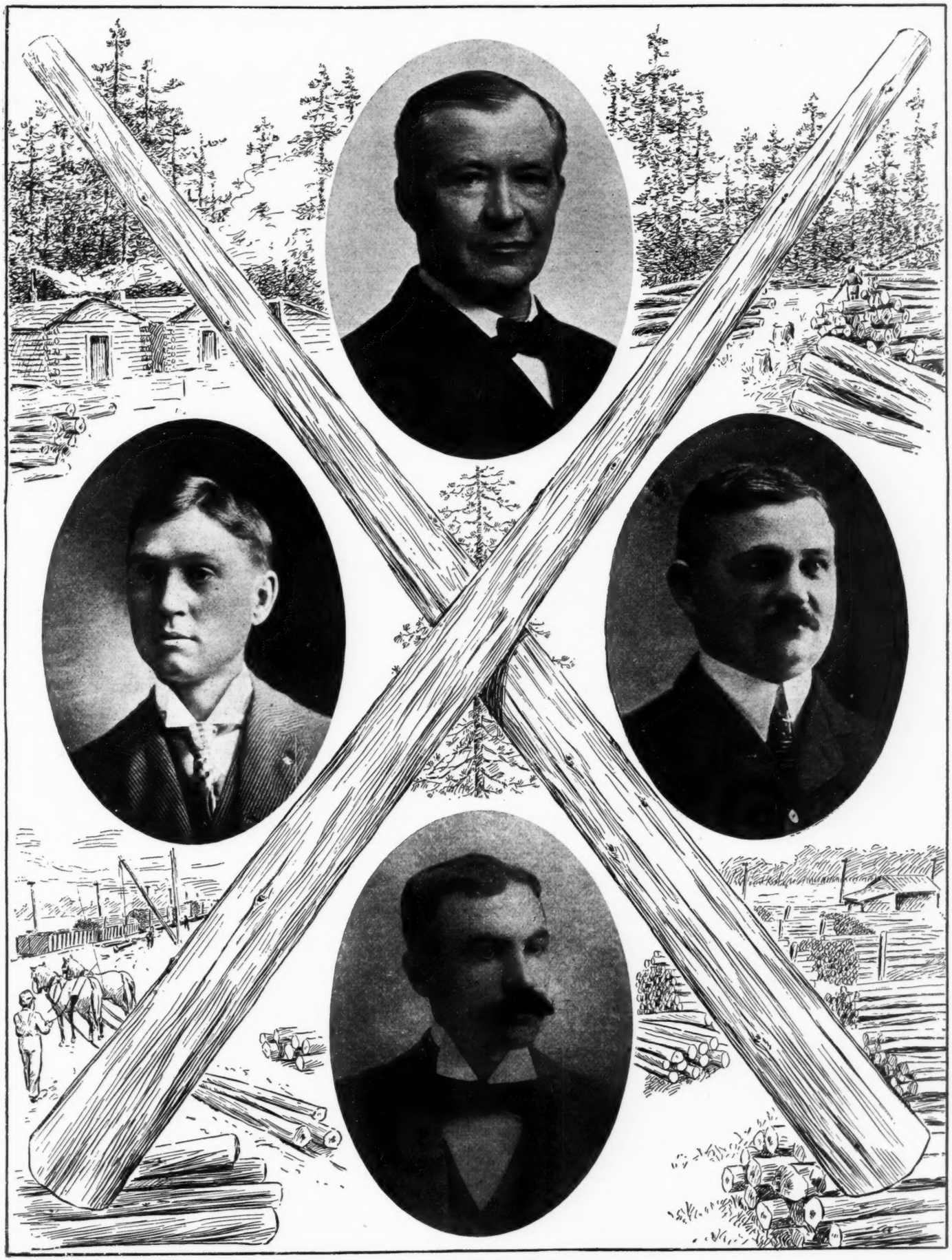
It seems to me, therefore, that it is in just such a situation as this that our association can be of greatest benefit to our members. This year price was not an important factor in selling posts; it was a question of demand, and if all members had held closely to the price list there would have been nearly as many posts sold and the result would have been more satisfactory.

I have noticed that when trade is booming and prices advancing all members feel kindly towards the association, and consider it very essential to the welfare of the cedar trade, but in times such as we have just passed through, you will often hear the remark, "The association is of no particular benefit." It is at just such a time that the association can be made a very beneficial agent, but this depends entirely upon the individual members. Without united efforts, we can accomplish nothing. "United we stand, divided we fall." I would, therefore, suggest that in making your price lists for the coming year, you study carefully the existing conditions and make a price list which you intend to adhere to.

I expect a much smaller production of posts this year than formerly and doubt if stocks on hand next May will exceed the usual amount carried at that time. There is nothing truer than the axiom, "Action and reaction are equal in an opposite direction," and I look for an unusually active shingle and post market during the coming year.

As I have stated before, I think that farmers in the older localities have their farms fairly well fenced, but they still require an immense number of posts for renewals and extensions and there is an endless demand for posts in the newer agricultural districts. The trade in poles has not been as active nor prices as firm as in the past few years, but stocks of short poles, twenty-foot in particular, are pretty well cleaned up.

Before closing I wish to say a word in regard to the inspection rules adopted by the association some time ago. In the words of the showman, "This feature alone is well worth the price of admission." If for nothing else, I am proud of the association for the good work it has done in this line. The most of you will remember the difficulties we had to contend with before these rules were established, and now they are used and recognized as author-



M. H. Coolidge, Vice-President.

M. K. Bissell, President.
W. B. Thomas, Treasurer.

H. W. Reade, Ex-President.

NEWLY-ELECTED OFFICERS AND EX-PRESIDENT OF NORTHWESTERN LUMBERMEN'S ASSOCIATION.

ity from the Atlantic to the Pacific and south to Mississippi and Texas.

Everything points to a very active and prosperous year in all industrial lines and it is my hope and belief that all of you may and will benefit by the general revival of business, and when we meet again at our next annual gathering, you can report your measure of prosperity as full, heaped up, and running over.

Secretary Hayden next read his annual report, which follows in full:

Mr. President and Gentlemen:—If it is the province of your secretary to say a few words regarding the white cedar market during the past year, he trusts it will not meet with the disapproval of the members to say that the various prices that have been secured for posts, poles and shingles by different members and by cedar dealers who are not members of this organization have not been entirely satisfactory. But he would also say that this has not been because of any indisposition on the part of a large majority of the members to get all there was in the business out of it.

There is one satisfaction to members of the association, hinging on the old saw that "misery loves company," and that is that the white cedar market has not been the only one that has been subjected to ups and downs—mostly downs—during the past year. In fact, it can be truthfully said that the white pine market has been about the only steady one during the year, and the reason for it is that the bulk of the white pine is in strong hands. The few small mills that have white pine to offer have not enough, in the aggregate, to bear the market even a few cents per thousand. During the year yellow pine was steadily on the down-grade until the manufacturers were forced to the realization that they were producing more lumber than the country was prepared to absorb. Hemlock has had a precarious career even with the majority of the output in the somewhat loose control of a central selling agency. West coast lumber has been against the problem of under-consumption. West coast shingles started the year well, with the product contracted for by a central selling agency, but the heterogeneous composition of the red cedar shingle industry could not be held together. The Interstate Red Cedar Shingle Company gave up the contest early in the year, and the shingle market has been a free-for-all during the past eight months. I think the members of this association have become reconciled to the situation, and have made the best of it, prepared for the worst, but hoping all the time for better things.

Under existing conditions, which were only a continuation of those of the latter part of the previous year, some of our members decided to go out of the white cedar business entirely. Because of this we have lost the Scott-Taylor Company of Ashland, and W. T. Reynolds of Minneapolis. I regret to say that Mr. Reynolds has since died. The Samuel Jackson Company was absorbed early in the year by the T. M. Partridge Lumber Company. John H. Fowler of Chicago was keeping up two memberships, the other as a member of the Fowler-Jacobs Company of Ashland, and decided that one was enough. The Harding Shingle Company was absorbed by the A. Spies Shingle Company, but as the latter concern has become a member, this does not represent a loss. The O. W. Smith Company of Chicago, Woodruff & Maguire of Rockford, Illinois, D. A. Hapeman of Earlsville, Illinois, and M. O. Hallack of Saxon, Wisconsin, have withdrawn. The Minnesota Cedar Company of Duluth, the Duluth Log Company and the Wittenberg Cedar Company have joined the association, and we end the year with a membership roll of sixty-eight.

In July your secretary received a communication from the secretary of the Northwestern Lumbermen's Association, stating that some of his members were complaining that producers of white cedar were filling out cars of poles with posts, or shipping full cars of posts to the rural telephone lines. He claimed that posts are a regular part of the stock of the retail dealers and urged that our members be asked to desist, or to charge prices for the posts that would enable them to recompense the retail dealers for their loss of trade. You are all familiar with the circular the directors of this association authorized the secretary to send to the members. As stated in that circular, and also to the secretary of the retailers' association, the members of this organization have no desire to act contrary to any of the so-called rules of trade ethics, but at the same time, we do not expect in return, that the retail trade shall buy supplies from those who are regularly engaged in the wholesaling of white cedar, and shall not go up into the woods and secure white cedar posts and shingles from the small jobbers who do not pretend to be carrying on a regular business of that character.

During the year the secretary received from a member of the association, a communication inquiring the meaning of the rule that admits of ten per cent of butt rot in poles. The rule states distinctly that rot to the extent of ten per cent of the area of the butt is allowable, but the question was as to what is the diameter of such an amount of rot. On inquiry the secretary found that controversy over this matter was not uncommon. Of course, a geometrical solution of the problem is possible at all times and for all sized poles, but for convenience in measurement it might set down that the diameter of a rot area amounting to ten per cent of the area of the butt of any pole is approximately equal to three-tenths of the diameter of the butt.

Responding to the quest of a number of our members, and acting under the instructions of the directors of the association, the secretary issued a call for a special meeting which was held in Minneapolis, March 29. As stated in the call, the meeting was for the purpose of discussing the post and pole market conditions. Twenty-five members of the association were represented at the meeting, the principal result of which was the selection of a supplementary price list committee, and the division of the enlarged committee of ten into two committees, one of which represented the eastern half of the association; the other the western half. These committees were authorized to gather the information necessary to the preparation of a new price list based on market conditions. The secretary sent out a circular to the members, asking for statements of the stocks at that time on hand. Only about one-half responded. These replies were turned over to the price list committee, but either the statistics were insufficient, or the committee did not find that conditions were sufficiently stable and consistent to warrant getting out a new list at that time.

At the last annual meeting your former secretary spoke of the action taken by the board of directors, June 12, 1903, in adopting the terms of sale that had been previously adopted by the National Lumber Manufacturers' Association. These terms were:

One and one-half per cent off the net invoice if payment was made within fifteen days.

One per cent off in thirty days, and net in sixty days.

The various lumber associations in the north could not get together on those terms, however, and finally the Wisconsin and the Mississippi Valley pine associations settled on the following terms:

Two per cent off the net invoice if payment is made within fifteen days. One per cent off in thirty days; net in sixty days.

Since those are the terms of sale in general use by lumber wholesalers in the north, it might be well for this association to rescind the action taken a year and a half ago, and adopt the terms just given.

Following out the instructions of the directors at the last annual meeting, your secretary compiled and issued, on February 6, a revision to the western classification book, correcting the freight rates as affecting points in Minnesota and South Dakota. Later, on March 29, under authority of the president, he issued a further supplement containing additions and corrections to the Iowa and Kansas classifications. With but few, if any, rates, the western classification book, as amended, is correct, but some recent changes east of the Mississippi river have changed the rates to a number of points in Illinois, and it might be advisable to issue a supplement to the eastern book.

A few days prior to December 7, your secretary learned of a meeting of representatives of the various lumber associations called for that date, to meet in Chicago and discuss railroad problems, particularly the difficulties that arise from over-weights. The chairman of our railroad committee, Mr. Watkins, found it impossible to attend, and suggested that the secretary ask Mr. MacGillis to represent us. Mr. MacGillis was, at that time, in Nebraska and could not go. As it was then too late to notify Mr. Thomas, the third member of the committee, the secretary wrote Mr. Worcester, asking him to attend the meeting. Mr. Worcester notified me that he and Mr. Watkins and Mr. Valentine went to the meeting, and he will undoubtedly have some report to make regarding it. In connection with this matter of over-weights, your secretary learned, during the past summer, of a number of claims against the railroads that had been found necessary by members of the association. After consultation with Mr. Watkins, he notified several members that if they would give the railroad committee the necessary details, that committee would make an effort to secure greater consideration from the roads and the weighing associations, but nothing further came of the effort.

In closing this review of a somewhat unsatisfactory year to the producers and wholesalers of white cedar products, it might be appropriate to say that this association, or any similar association cannot hope to have the power to regulate the demand for what it has to sell. And where the members do not constitute the entirety of the producers it is equally impossible to regulate the supply. But there are other functions of the association that can be made of great benefit. Many of these have already been assumed, and it is unnecessary to estimate the value of the classification books, the unity of action on such matters as the terms of sale, the possibilities for securing fair treatment from the railroads in the matter of freights and the handling of claims for over-weights, and the adoption of uniformity in specifications. Even the official price list has its value, though it may not at times represent the market. Further than these, your secretary would repeat the statement made by your former secretary, that if it were possible to occasionally gather statistics of the amount of stocks in the hands of each member and issue this information to all the members, it would do much to establish stability in the market, and would serve as a guide to the committee on values.

While your secretary lays no claims to qualifications as a prophet, he believes that the coming year will not be a repetition of the last. It is not necessary to review the conditions and circumstances that have made the past year a bad one for the cedar trade. You are all familiar with them, for you have been up against them. But

you are also familiar with the signs of the times that give bright promise for the new year. A five billion dollar crop raised by the farmers of the country in 1904 will go a long way toward healing the sores that have made you uncomfortable. Respectfully submitted.

Treasurer W. B. Thomas of Manistique, Michigan, then presented his report of the finances of the organization, which show a satisfactory balance on hand. Without going into details the report is as follows:

Balance received from H. W. Reade, former treasurer	$11.06
Receipts	735.00
Total	$746.06
Expenses, including salaries of secretary and treasurer	421.20
Balance on hand	$304.86

Reports of committees being called for, R. H. Downing, chairman of the post and shingle committee, announced that the members of his committee had concluded after a careful survey of the situation to recommend a list that would be nearer the selling value of cedar products than the old one. After some discussion the report was adopted, upon motion of M. K. Bissell.

M. H. Coolidge, chairman of the inspection committee, was called on and said that his committee had had no meeting during the year, as there had been but one call for the services of an inspector.

W. T. Watkins, chairman of the railroad committee, was absent and as the only report of matters coming under the jurisdiction of this committee was of the meeting held in Chicago of the representatives of various lumber associations, which meeting had been attended by C. H. Worcester, A. D. Watson and E. H. Valentine, Mr. Worcester was called upon for a report of same.

W. G. Hollis, secretary of the Northwestern Lumbermen's Association, was then introduced and spoke at some length of the advantages to be gained through reciprocal relations between the retail associations and white cedar producers. He believed that members of the cedar association would be greatly benefited by such an arrangement; that if they were disposed to protect the retail dealer, and not sell posts direct to the consumer or to poaching concerns that sold to the consumer, they would in return receive the undivided trade of regular retail association dealers. Following his remarks on reciprocity, Mr. Hollis outlined the plan for the meeting of the Northwestern association in Minneapolis.

President Reade then asked the members what their pleasure was regarding Mr. Hollis' proposition. He would suggest that they be taken up separately and that the reciprocity proposition be first considered.

C. H. Worcester believed that the matter could be well handled by the trades relation committee, and moved that the president be empowered to appoint a committee of three whose duty it would be to take up this work.

After some discussion the motion was offered to the house and carried without a dissenting voice.

The chair then appointed as a trades relation committee: C. H. Worcester, H. S. Gilkey, R. H. Downing.

Taking up the second subject of Mr. Hollis' remarks, the secretary announced that he received a similar communication and request from G. W. Hotchkiss, secretary of the Illinois Lumber Dealers' Association. On motion of Mr. Worcester the president was authorized to appoint a representative to speak for the cedar products at both the Northwestern Lumbermen's Association meeting and that of the Illinois dealers.

President Reade appointed R. H. Downing as the official representative and orator.

Secretary Hayden read an amendment to the constitution which had been proposed at a meeting of the board of directors held in the forenoon. He explained that under the present constitution all of the members of the board of directors were elected annually and the board believed that it would be to the best interest of the association to have a part of the directory hold over for two years. The proposed amendment was as follows:

Commencing with the annual meeting held at Milwaukee, January 3, 1905, and annually thereafter, terms of newly elected directors (aside from the ex-officio directors) shall be for two years, excepting that at the annual meeting of January 3, 1905, the terms of two of the directors then elected shall be for one year and the terms of the remaining two for two years.

The amendment was adopted.

The election of officers being in order, the chairman appointed as a nominating committee E. H. Valentine of Chicago; C. H. Worcester of Chicago; F. J. Lang of Hermansville, Michigan; M. K. Bissell of Escanaba, Michigan, and R. H. Downing of Minneapolis. The convention took a short recess during the absence of the nominating committee.

The final report of the nominating committee was as follows:

President—M. K. Bissell, Escanaba, Michigan.

Vice-President—Marshall H. Coolidge, Minneapolis.

Treasurer—W. B. Thomas, Manistique, Michigan.

Directors: Two-year term—E. H. Valentine, Chicago; H. S. Gilkey, Minneapolis. One-year term—H. W. Reade, Escanaba, Michigan; George Nicholson, Jr., Manistique, Michigan.

The report of the nominating committee was adopted and the above officers declared elected.

It was moved and seconded that the thanks of the Northwestern Cedarmen's Association be extended to ex-President Reade for his efficient services during the past year, which was carried unanimously.

President Reade at this juncture surrendered the chair to his successor, Mr. Bissell, who upon assuming his new duties thanked the members gracefully for his preferment.

H. S. Gilkey stated that he had recently consulted with various members regarding a needed improvement in conducting the affairs of the association and he believed that the time was now ripe when some effective organization should be adopted. He thought that this could be accomplished by the employment of a paid secretary, who could devote his entire time to the affairs of the association, compile statistics, visit the plants of the members and keep the cedar men thoroughly posted on the condition of the market, stocks and other points of vital interest. In pursuance of this idea he offered a motion that a committee of ten members be appointed by the chair to consider this proposition and that this committee be given full authority to act.

After a brief discussion of the question a rising vote was taken and the motion was carried unanimously.

It being found that the constitution empowered the directors to employ a secretary, fix the salary and virtually make all arrangements necessary, it was moved that the directors retire and endeavor to formulate a proposition for carrying out the sense of the meeting and employ a permanent secretary and bring it before the meeting for adoption. This was unanimously agreed to and a short recess was taken while the directors conferred.

Upon being called to order again, the directors submitted a recommendation for a change in the constitution, raising the initiation fee from $10 to $25 and the annual dues to $75. After some discussion the amendment was put to a vote and carried unanimously.

As there was no further business to come before the meeting the convention, on motion, adjourned.

Daniel MacGillis and T. A. Bruett, representing respectively the MacGillis & Gibbs Lumber Company and the Wilbur Lumber Company, the two Milwaukee members of the association, were the head entertainers of the convention and proved themselves fully equal to the occasion. During the day their hospitality was continually in evidence, and in the evening they entertained the visiting cedarmen at a banquet, held in the red room of the hotel.

Concerning Party Line Switching

SAMUEL G. McMEEN

TELEPHONE party lines have been turned to with constant regularity since the earliest telephone times, in the hope of reducing the cost of producing telephone service. Where the lines are long and costly, there is a real saving to be accomplished by dividing the expense of owning and maintaining a line among several stations. But if a party line is provided with stations which have but little business with each other, or are so equipped that they are not able to call each other even if they have such business, the work required of the operator in attending to calls coming from the party line will be quite as great under such conditions as if the stations were each on a line of its own.

In an almost absolute degree, therefore, the cost of switching calls that come from party lines is the same as switching an equal number of calls from individual lines. This statement is made with reference to the total labor involved in switching; insofar as the use of party lines may diminish the investment in certain parts of the central office equipment, such as multiple jacks, relay signals, etc., there may be a slight reduction in central office costs for that reason.

Manifestly the simplest form of party line is one carrying two stations. Naturally also the best two-party line is one having equipments which will be noninterfering as to received signals. If the ringers of both stations are bridged across the line, both will ring when either rings; but if the ringer at each station be bridged from one of the line wires to the ground or to a third wire, the signal for one station may be rung upon one wire without passing through the circuit of the other station.

Figure 1 illustrates the essential features of the two-party system commonly used by both Bell and Independent companies. The equipment in the central office is quite the same as if the line were carrying but one station; that is, there is a single answering jack and only one series of multiple jacks if the equipment be a multiple system. There is only one jack if the equipment be without a multiple.

The plug illustrated in Fig. 1 is shown to be in an electrical condition to ring station No. 2, as the alternating current from the ringing generator is passing over the lower wire of the pair as illustrated. The other wire remains grounded during the time of ringing, so that if the called subscriber should answer before the ringing current is withdrawn from the plug, current will not pass through the telephone circuit and thence to ground at the ringer of the other station. It is to be noted that the conditions of connection between the plug parts and the generator and ground shown in Fig. 1 is that which is caused by the pressure of the ringing key to call station No. 2. In calling station No. 1 these conditions are established by the ringing key in such a way as to place the ground on the ring of the plug and the generator connection on the tip. When the ringing ceases, both ground and generator circuits are taken off and the rest of the regular circuits are attached.

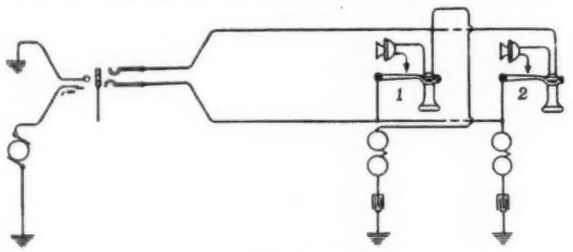


FIG. 1.

While the line circuit equipment of the switchboard is thus as simple for a two-party line as for an individual line, there are certain disadvantages involved. Each calling cord of the entire switchboard must be equipped with two ringing buttons, one for each of the two-party stations; or, if but one ringing button is provided per calling cord, a master key must be associated with the operator's equipment. Where the latter plan is used, it is necessary to operate this master key at the same time the cord circuit ringing key is operated. One of the most difficult features of office management is to insure that operators will not occasionally mishandle the master key equipment.

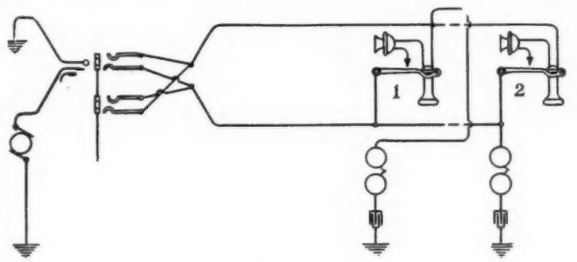


FIG. 2.

A further disadvantage of the jack per line arrangement is that special director numbers are required which will indicate to the operator when she hears them, not only the identity of the jack number that is called, but the identity of the station on the line. In some exchanges it is customary to distinguish stations from each other by the use of letters, as 1670A and 1670D. The letters are chosen with due regard to their vowel sounds, as it is disastrous to use letters having much similarity to each other. It will be seen that upon hearing such a number-and-letter combination, an operator must not only select and connect with the called line, but must go through an additional mental and manual operation in selecting the called station from the two which are on the line. While it is true that the ability of operators is great enough to enable them to acquire skill in handling very complicated methods, it is absolutely true also that the more complicated the operations the greater the errors which creep in and the more costly is the handling of a given amount of traffic. To obviate the disadvantages which exist in two-party lines as compared with individual lines, the arrangement shown in Figure 2 has been devised and is in reasonably wide use. The scheme of things therein, so far as the cord circuits are concerned, for ringing upon individual and two-party lines, is a uniform operation.

In the particular type of circuit illustrated, the ringing current is always given to the ring of the plug, ground being placed upon the tip at the time of ringing. The stations of the two-party lines are equipped with ringers bridged to ground from the respective sides of the line. As shown in Figure 1, the ringer has in series with it a condenser to maintain the insulation of the line for direct currents.

The point of difference between this arrangement and that shown in Fig. 1 is that two jacks are provided, one serving to call one of the stations and the other another. If the equipment be a multiple board there will be two answering jacks and two separate series of multiple jacks. In every feature except that the test rings of both sets of

jacks are connected together, the central office equipment is quite the same as if there were two lines involved instead of one.

It will be noted in the figure, however, that the line circuits of the two sets of jacks are transposed with reference to each other. If a plug be inserted in one of the jacks and ringing current applied, it will call station one, while it will call station two if inserted in the other. With this arrangement of duplicate equipment on the switchboard, operating methods are exactly the same whether party lines or individual lines are being called upon. Directory numbers for individual and two-party lines will be of the same general order. Letter designations will be eliminated from the directory. Master keys or duplicate keys will be unnecessary.

In four-party line systems, the situation becomes more complicated; because, in addition to the requirement of ringing on one side of the line or the other, there is the requirement of supplying one or the other of two kinds of ringing current. Figure 3 illustrates the conditions which are required for four-party signaling at its simplest. Here the calling plug requires to be equipped with four ringing keys; or, if the most rigid economy is practiced, a master key of four positions must be provided for each operator's equipment. If the latter plan is used, the danger of wrong setting of the master key considerably magnifies the opportunities of accident. The directory designations for this arrangement must be such as to identify the called line by figures and the called station by letters, and the chances of mistaking one letter for another is still greater than when only two are used.

Many ingenious arrangements have been devised, obviating the use of letters and attaching terminal figures to indicate the identity of the called station. For example, assuming the jack number of the called line to be 176, directory numbers of the stations on that line have been made 1761, 1762, 1763 and 1764, the ringing buttons being numbered 1, 2, 3 and 4. The operators are advised to interpret the first three figures to denote the jack number and the last to denote the ringing key. Advantageous as this plan is, it has two serious objections. One is, that in large offices there will be a conflict between party line numbers built up on this plan, and individual line numbers actually existing in the multiple, unless all the three-figure numbers of the multiple are restricted from being given to the party lines. The second disadvantage is that by choosing only four-figure numbers for party lines and suffixing the necessary station designation, the resulting directory numbers for party lines will be of five figures each. For example, if a

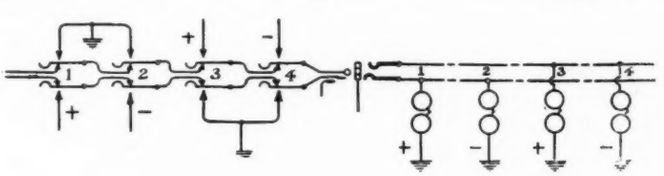


FIG. 3.

four-party line terminates in jack 3946, the directory numbers of the stations will be 39461 to 39464 inclusive.

Study and experiment has shown that chance of error with five-figure directory designation becomes very serious. We all know that it is easy to remember a telephone number of a single digit, harder to remember one of two digits, still harder one of three digits, possible to remember one of four digits, and we will admit that it is quite impossible to remember one as long as six digits. It seems reasonable to suppose that a number of four digits is about as large as one can carry in mind from the directory to the telephone instrument. The horror of a five-digit number is all the greater when it is remembered that in a large exchange it must be associated with the name of an office as well.

But these disadvantages of special designation, complexity of ringing, and mental and manual operations of a special character are eliminated by the four-party arrangement shown in Fig. 4. In this the transposing or "twisting" of the line conductors is carried out as in the case of the two-party line shown in Figure 2. The arrangement of the station ringers with reference to the ground and two sides of the line is quite the same as in Fig. 3, and in neither case are there any condensers in series with the ringers.

An examination of the circuit relations of the springs of the four jacks used with one such line will show that the first and third jacks counting from the top have the same relation of long and short springs to the two-line wires, while the second and fourth jacks have the same relation

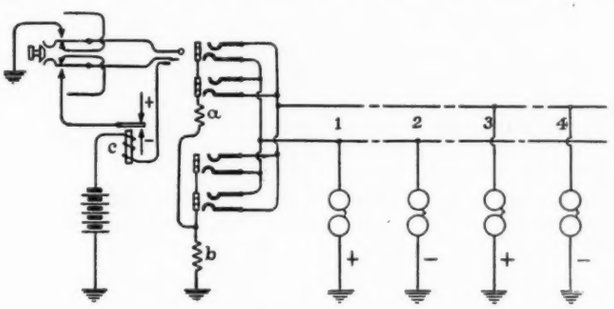


FIG. 4.

between themselves, but are transposed as to the pair first mentioned.

The test rings of the third and fourth jacks are connected together and to ground through the resistance *b*. The test rings of the first and second jacks are connected together and have a path to ground through the resistance *a* in series with the resistance *b*. The plug shown is a calling plug of a pair and is provided with a single ringing key. Whatever station may be called, an operation of this ringing key places ground upon the tip of the plug. If the plug be in either the first or second jacks counting from the top, the combined resistance of *a* and *b* will be such as not to permit the operation of the relay *c*. Positive pulsating current will then be given to the one side or the other of the line, depending upon which is connected with the long spring of the pack in which the plug is inserted.

If, however, the plug be inserted in either the third or the fourth jack, the relay *c* will be operated, because the resistance *b* is low enough to permit it. Negative pulsating current will then be given to the ringing key. As the transposition of wires in the jacks has determined which wire shall be rung upon, and as the presence or absence of the resistance *a* has determined the polarity of the ringing current, all the requirements of four-party signaling have been provided, without the necessity of the operator exercising any mental ability of other than a usual sort.

Whether or not so complicated an arrangement as this is justified by the requirements of the service is a matter which requires to be solved with relation to any given set of circumstances. Speaking generally, for average city conditions and the usual present costs of line construction and central office equipment, it may be said that in terms of annual cost of giving service at a given rate of calling per station, individual lines stand highest, two-party lines next highest by a fairly substantial margin, and four-party lines only a very little lower than two-party lines.

This is for city conditions. In the smaller communities, where the central office equipment is not elaborate and where there are many lines of considerable length leading into the country, the saving of annual line expense becomes great enough to make four-party lines distinctly cheaper than two-party lines.

The telephone quickens our life.

Convention of Wisconsin Independents

THE annual convention of the Independent Telephone Association of Wisconsin was held at Milwaukee, January 25 and 26. The meeting was called to order by the president, Richard Valentine, at the Hotel Pfister club room, Wednesday, January 25, at 2 p. m. The president said that perhaps the most important business before the association was the question of presenting to the legislature for the second time a bill to prohibit discrimination in the charges of telephone rentals in different cities and villages, being the same bill that was defeated two years ago, by one vote, in the Wisconsin legislature. The purpose of this bill is to prevent the Bell company putting the price down to nothing, perhaps, in one locality to wipe out competition, while keeping the price inordinately high in another locality where that company has a monopoly. J. C. Harper of Madison described the bill minutely, and urged that every member of the association see his member of the legislature and impress upon him the importance of passing the bill.

The chair appointed as a committee on legislation, J. C. Kuoni, of the Troy & Honey Creek Company; J. C. Harper, of the Dane County Company; J. M. Baer, of the Fox River Valley Company; Philip Sheridan, of the Valley Telephone Company, and E. M. Miller, of the Central Wisconsin Company. By vote of the association the president was made chairman of the committee *ex officio*.

Mr. Davenport gave an account of the successful installation of the Green Bay exchange.

The first session on Thursday, January 26, was called to order by the president at 11 a. m. J. B. Hoge, president of the National Independent Telephone Association of America, gave a synopsis of the development of the Independent telephone movement, and stated that to-day the Independents have over 2,500,000 telephones in the United States, as against 2,000,000 claimed by the Bell company. The Independents are rapidly getting long-distance lines extended throughout the country. The Bell people are earnestly endeavoring to get the Independents to break loose and make toll line contracts with the Bell company, but are on the whole unsuccessful. He urged the advisability of consolidation of all local associations with the newly organized National-Interstate Telephone Association. Community of interests should keep the Independent companies so closely associated as to present a solid front against all unfair opposition. He suggested the adoption of a sign to be used generally by the local companies, being an enameled sign, with shield, stars and bars, in red, white and blue, and bearing the inscription, "Independent Local and Long-Distance Telephone." This suggestion was adopted by the association.

H. A. Nuttall of Chicago, formerly of the Bell Telephone Company, then delivered an address on "The Ways and Wiles of the Bell Telephone Company." He spoke strongly on the subject of the "bluff" of the sub-licensee. The Bell people are bidding for long-distance service and are not really willing, notwithstanding their assertions to the contrary, to put in exchanges in small places. To illustrate what he meant by "bluff," the speaker related an incident where the Bell company sent material for the installation of a local exchange, had the material left on the railroad station platform, and then told the local agent that a new station was going to be put in there unless toll-line arrangements were made with the Bell company, when, as the speaker claims, the Bell company really had no intention of installing a local station.

George Walker Wilder, professor of telephony in the Armour Institute of Technology, then delivered an address on "Simultaneous Telegraphy and Telephony." He said that it was perfectly practicable, and at very small expense —not to exceed $15 for a small station—to equip the line with automatic telegraph instruments, such as are used in Germany, and send telegraph messages over the telephonic circuit; that these messages did not interfere with the telephonic message, and could be operated in duplex, if not in quadruplex. This adaptability of the copper telephonic circuit to telegraphic purposes is much greater than the adaptability of the telegraphic circuit to telephonic purposes, although telegraph lines are used to a considerable extent in railroad service for telephonic work even at present. The income from a local telegraph business would be almost entirely net. The Bell company has a simultaneous system now, in which they are trying to interest the railroads.

E. C. Lewis said the Chicago & Northwestern Railroad Company was installing telephones on existing telegraph lines, and meeting with good success. It is the intention of the company to install telephones on its branch lines for railway purposes, to the exclusion of the telegraph operator.

Don Farnsworth of New York stated that he was securing information looking to the gaining of a wider field and demand for the marketing of Independent telephone securities, and that he had connected himself with a bonding house, which would soon open a branch in Chicago.

J. B. Hoge of Cleveland, president of the National association, strongly advocated the amalgamation of all Independent association interests by affiliation with the National association.

President Valentine appointed as a committee to confer with Mr. Hoge regarding the affiliation, Secretary H. C. Winter, J. C. Murdoch and W. F. Goodrich.

J. C. Harper spoke of the insincerity of the Bell company in the making of its toll-line contracts.

In the afternoon a motion was unanimously carried instructing the officers to apply for membership in the National association, and ordering that the executive committee take up the question of districting the state for the best interests of the Independent telephone companies in the state of Wisconsin.

The secretary presented his report, showing sixty-four active and twenty-nine associate members, comprising approximately three-quarters of the Independent telephone interests in the state. In 1902, forty-one new companies were incorporated, with an aggregate capital of $1,068,000. In 1903 forty-nine companies were incorporated with a total capitalization of $500,000. Last year thirty-two companies was incorporated, with a capital of $1,267,340. The tendency seems to be toward the forming of smaller companies, and the small towns and rural districts are now being more extensively developed. There are now in Wisconsin about 275 Independent telephone companies, with an investment of $4,000,000, with 1,200 toll stations, 350 exchanges and 37,000 subscribers. Independent stations are being installed in Green Bay and De Pere. A first-class copper toll-line has been completed between Minneapolis and La Crosse, and will soon be extended much farther.

The following officers were elected for the ensuing year:

President, Richard Valentine, Janesville; vice-president, J. C. Kuoni, Sauk City; secretary-treasurer, H. C. Winter, Madison.

Executive Committee: W. van Middlesworth, Racine; Philip Sheridan, Green Bay; J. C. Harper, Madison; W. F.

Goodrich, La Crosse; H. V. Bartlett, Chippewa Falls; J. M. Baer, Appleton; E. M. Miller, Hixton; J. C. Crowley, Superior.

Milwaukee was fixed upon as the next place of meeting, and the third Wednesday and Thursday of December, 1905, were chosen as the date of meeting.

Mr. Goodrich described the toll-line that the Tri-State Company has lately built into La Crosse from Minneapolis.

As delegates to the next convention of the National association there were chosen: John M. Baer, Appleton; W. F. Goodrich, La Crosse, and J. C. Harper, Madison. As alternates: Professor V. W. Wilder, Chicago; Charles Schernecker, Sun Prairie, and Philip Sheridan, Green Bay.

The convention then adjourned.

Following is a list of the telephone companies represented at the convention and the delegates representing each:

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Badger State Telephone and Telegraph Company, Neillsville; W. S. Smith.

Badger Telephone & Telegraph Company, Milwaukee; E. Sipperly.

Beloit Telephone Company; Alfred Slater.

Broadhead Telephone Company, Broadhead; J. C. Murdoch, O. C. Schultz.

Cambridge Telephone Company, Cambridge; G. W. Wilder.

Central Wisconsin Telephone Company, Hixton; E. A. Miller, W. A. Marr.

Citizens' Telephone Company, Racine; William Van Middlesworth, A. T. Gille.

Dane County Telephone Company; J. C. Harper.

Dane County Rural Telephone Company, Madison; H. C. Winter.

Eastern Wisconsin Telephone Company, Kiel; L. H. Schram, A. A. Paulson, H. A. Kraemer.

Edgerton Telephone Company, Edgerton; F. W. McKinney, P. C. Brown, William McIntosh.

Fox River Valley Telephone Company, Appleton; J. M. Baer, D. J. Doyle.

Independent Consolidated Telephone Company, Weyauwega; A. L. Hutchinson, O. Morsman, N. W. Low.

Interurban Telephone Company, Sun Prairie; Charles Schernecker, B. J. Anderson.

LaCrosse Telephone Company, LaCrosse; W. F. Goodrich.

Monroe Telephone Company, Monroe; C. W. Twining.

Monroe County Telephone Company, Sparta; H. Teasdale, R. B. McCoy.

Orfordville Telephone Company, Orfordville; F. A. Cole.

People's Telephone Company, Royal; J. L. Farrington.

Portage Telephone Company; F. H. Runkel, L. F. Schulz.

Rock County Telephone Company, Janesville; Richard Valentine.

Rock County Farmers' Telephone Company; H. C. Willitz.

Stoughton Independent Telephone Co.; E. Sipperly.

United Telephone Company, Monroe; C. W. Twining.

United Telephone and Telegraph Company, Hyde Park, Ill.; James S. Nealey.

Troy & Honey Creek Telephone Company, Sauk City; J. C. Kuoni, A. E. Von Wold.

Mazomanie Telephone Company, Mazomanie; D. L. Bester.

Star Telephone Company, Mt. Sterling; H. F. Mitchell.

Jefferson County Telephone Company, Ft. Atkinson; John N. Hager.

Pine Bluff Telephone Company, Riley; Joseph F. Faust.

Chippewa County Telephone Company, Eagle Point; N. V. Bartlett.

Grafton Telephone Company, Grafton; F. W. Mintzlaff, John Q. Buch, F. C. Mintzlaff.

Marshfield Telephone Company, Marshfield; J. C. Marsh.

Marion & Northern Telephone Company, Marion; W. H. Hockenberger.

Badger Farm Telephone Company, Milwaukee; W. T. Whitehead, W. C. Blaisdale.

Kirchayne & Cedarburg Telephone Company, Kirchayne; W. Smith.

Jefferson Telephone Company, Judah; J. F. Kryder.

Antigo Telephone Company, Antigo; Edward Clairy.

United States Toll Line Company, Cleveland, Ohio; James B. Hore.

Mineral Point Telephone Company, Mineral Point; R. J. Penhallegin.

Eagle River Telephone Company, East Troy; Ed. J. Tins, F. W. Schwinn.

Eau Claire County Telephone Company, Eau Claire; C. A. Silkworth.

Markesan Telephone Company, Markesan; Wm. Miller.

Interstate Independent Telephone and Telegraph Company, Joliet; C. N. Cheadle.

Mondova Telephone Company, Mondova; C. W. Gilman.

Amory Electric Company, Amory; George F. Griffin.

Following is a list of the exhibitors and the representatives in charge of each:

American Electric Telephone Company; M. W. Zabal, H. A. Nuttall, S. J. Bear.

J. Andrae & Son's Company; H. P. Andrae, J. C. Schmidtbauer.

Automatic Electric Company; C. L. Fisher.

Electric Appliance Company; L. A. Dinsmore, J. B. McMullin.

Electric Supply Company; L. W. Burch.

Eureka Electric Company; R. B. Mitten, C. W. Robbins.

Holtzer-Cabot Electric Company; E. R. Harding.

International Telephone Supply Company; H. H. Davenport.

Kellogg Switchboard and Supply Company; F. E. Rotohka.

Monarch Telephone Manufacturing Company; E. E. Yaxley, W. H. Trimm.

J. A. Roebling Son's Company; W. H. Slingluff, Bond Wisler.

Signalphone Company; A. D. Weller.

Standard Telephone and Electric Company; N. L. Eldred, H. C. Biester.

Sterling Electric Company; W. E. Doolittle, C. R. Brown.

Stromberg-Carlson Telephone Manufacturing Company; J. J. Nate, E. C. Lewis.

Vought-Berger Company; J. G. Ball.

Kusel & Kusel Company; H. J. Kusel.

Milwaukee Telephone Manufacturing Company; F. J. Whittemore.

Frank B. Cook Company; F. W. Pardee, F. B. Cook, G. C. Fricke.

Dean Electric Company; R. H. Manson.

Standard Underground Cable Company; J. Pietzcker and J. E. O'Neill.

American Electric Fuse Company; F. B. Upton.

Independent Telephone Manufacturing Company; A. F. Adams.

A. Meinema & Company; Albert Meinema.

Williams-Abbott Company; L. Sands.

Monarch Electric Wire Company; C. A. Kuhlman.

North Electric Company; Charles H. North.

TELEPHONY Publishing Company; H. B. McMeal.

TELEPHONIC PROFANITY.

One of the difficulties attending radical changes which come close to human life and experience is the reluctance of people to conform to reasonable restrictions and adjust themselves to the new order of things. After being content with hum-drum methods for a long time, people are very apt to demand absolute perfection in any new departure.

Just at present, in some quarters, there is much agitation concerning the limitations of the telephone. Fault is found (and justly, too) with the custom of calling a subscriber, and then asking him to "wait a minute," while the person who called him, or more properly speaking, caused him to be called, is summoned. The complaint is also frequently made that conversation over a telephone line is not strictly secret. Possibly the most curious instance of the latter limitation is found in the protest of a subscriber, who had been reminded of the apparently reasonable rule prohibiting profanity on the telephone. The apparently logical point was made that if the operator had not been listening to the conversation she would not have been shocked by the strenuous language.

The matter of telephonic profanity is one which gives managers of telephone exchanges in large cities much anxiety. By the very nature of the telephone exchange business there must be a means of cutting into a telephone circuit at will in order that the operation of the exchange may be facilitated to the mutual advantage of all the subscribers. In a way, it is simply a telephone clearing house. It would seem to be unreasonable to demand absolute secrecy of communication in such clearing-house practice, although it is surprising how little attention is paid by operators to the conversation of subscribers. Not only have these busy people all they can do to attend to their immediate business, but they are restricted from curious listening by laws as imperative as those of the Medes and Persians.

QUESTIONS AND ANSWERS

Conducted by J. C. Kelsey, Purdue University, Lafayette, Indiana.

Can you throw any light on the following trouble caused by lightning, and if possible, suggest a preventive in case of future recurrence? After a severe thunderstorm we found that lightning had gotten into a 52-pair aerial cable, paper, disconnecting one wire, short-circuiting one pair of wires and rupturing the ozokerite tape and jute covering at four different points within a distance of 100 yards, the opening at each rupture being about three inches square. The rubber tube in each case was punctured, the hole being very small, and appeared to have been blown up like a balloon until it burst. Under the tube and next to the paper insulated wires the impact had been very great, the depression being deep enough to receive the ball of the thumb, under each of the four punctures, a number of wires (varying from six to twelve) had been bared, the paper being burned; the pitting and scorching of the wires extended in one case right to the core of the cable; the faulty wires mentioned above were on the outside layer, the disconnected wire being needle pointed on the side nearest the cable box, and ball shaped nearest central.

At each of the four ruptures, a current had passed between the cable and the guide wire, through the cable hanger, the guide wire in each case being deeply pitted. At the central cable box all the fuses were blown, and one of the circuits in the core of the cable had its fuse springs burned in two; this same circuit was struck down by the lightning on the aerial line about 150 yards out of the cable, and near the subscriber's house. Seven of the circuits on the outside layer of the cable were trunk lines, two of which were the faulty wires mentioned above.

Following are details of the situation: Fifty-two pairs dry core cable, 1¼ miles long; four ruptures occurred about 1,200 yards from central; guide wire goes to earth at five points only, through terminating bands on poles; cable hangers are of zinc; from point of trouble to cable box is one series of strata of solid rock and is the commencement of and finish of a steep hill; from point of trouble to central the poles are planted in deep, loamy soil; the cable terminal box is of iron, fitted with double pole three ampere fuses, and carbon and mica dischargers—aerial side to fuse and cable to carbon; the earth for terminal box is No. 14 copper attached to water pipe at foot of pole.

I must apologize for lengthy question, but being a matter of interest to the general telephonic world, I hope you will deal with the subject in detail. "Lightning vs. Telephones" seems to be a subject severely let alone in the telephonic press. An article from the able pen of K. B. Miller on "The Protection of Cables from Lightning" I think would be generally appreciated.—T. H. Watson, Transvaal, South Africa.

Another lightning trouble is reported this month:

We have a great deal of lightning trouble on cables using marlin hangers. Holes are made in the sheath under the hangers. The strange part of it is that the holes are always under the hangers, and it makes no difference whether the suspension wire and cable is grounded or not. When metallic hangers are used, the trouble does not appear. Trouble has occurred within three inches of a ground wire, which connects suspension wire and cable to earth.—G. S.

Still another:

We are operating a series arc light system in connection with our telephone system. There are arresters at the power station. During a severe storm lightning struck the line, melting the wires in two, and punctured all the series lamp coils clear back to the station arrester. Is there no way of protecting line and lamps from lightning?—J. S.

Here are three cases, identical in one respect, that they all deal with the question of outside protection. It reveals the fact that present protection is only for the benefit of the central station apparatus. The outside systems have to get along as well as they can. Fortunately, the lightning rarely strikes the line itself. There is no particular reason why a lightning stroke should single out a power, or telephone line and cable, and strike it, because when one thinks of the mighty energy involved in a lightning stroke, it is hard to believe that a feeble thing like a line would tend to divert it from its original course. I was once sitting in the cab of a large locomotive, when lightning struck a milkweed not more than 100 yards away. We were stunned, but suffered no inconvenience. If there was anything in the idea that certain materials attract lightning, the engine and rails would always be at the mercy of lightning. But if lightning in its natural course would strike a locomotive, it is plain to see that destruction would be inevitable.

The reason that lightning has not been discussed more is that there is nothing definite to be discussed about it. It behaves this way here, and an instant later will behave another way at a distant point. N. J. Neall of the Westinghouse company says: "Early scientists gave much thought to the phenomena of lightning, and endeavored to devise a means of protection, but aside from Franklin's classic experiment in drawing a charge from a cloud, and Lodge's experimental solution of the controversy between Faraday and Snow Harris as to the best material and form of lightning rods, little or no advance has been made in the *protection against direct strokes of lightning.*"

When electrical devices came into general use it was found that disturbances came from lightning when the real stroke was a great distance away. And it has been discovered that these effects are destructive to windings and kindred devices. As these induced effects are present at each stroke of lightning, whether direct or at a distance, it became necessary to work along these lines. This induced charge is called the counter charge. Suppose that a charged cloud approaches a line, fairly insulated from the earth, and positive in character. A charge is induced on the line, negative in character, but bound. There is also an induced charge on the line, positive in character, but free, and can escape.

If the cloud moves up slowly, the free positive charge can escape to earth through the natural leakage of the line, at such places as insulators, carbon arresters, etc., are found.

If the cloud comes up at a fast pace, the induced positive charge is greater in amount, and the natural leakage of the line cannot carry off the charge swiftly enough. The charge will pile up on the wire, constantly increasing in pressure, until it gets strong enough to jump to earth through the weakest spot in the circuit. That weakest spot should be the arrester, connected to earth by a straight wire of no resistance, and having a perfect earth. No harm will then be done. If the cloud moves away slowly, the negative bound charge is set free and it escapes to earth. If the cloud passes away quickly, the bound charge is set free so quickly that the natural line leakage cannot keep it from being dammed up, thereby allowing it to accumulate until its pressure rises high enough to jump across to ground, which point should be the arrester.

This rise of pressure, which may become destructive, acts a great deal like the following: Take, for instance, a dam, with a certain amount of over-excess of water. To prevent this excess of water rising high enough to weaken or destroy the dam an outlet pipe is placed at the bottom of the dam to let the excess water flow. Now suppose that a waterspout occurs. Along comes a great excess of water, just as the lightning charge caused an excessive charge of elec-

tricity. If the outlet pipe at the bottom of the dam could be made large enough, it could carry all this excess water off and prevent the straining or destruction of the dam wall. But the outlet pipe is too small, hence the water rises quickly, attains a weight, hence a great pressure, and the dam is thrown over, causing great damage to the valley beneath, destroying houses, barns and lighter material, while huge trees and other powerful devices stand unharmed. Now when the lightning strikes there is a vast overflow of electric charge, which naturally destroys the weak spots, or objects, and spares the strong places. Referring again to the analogy of the bursting dam, the lightning charge likewise demands an outlet, which must have a capacity for handling excess charges, or those charges will rise in pressure until they commence to jump through cables, coils, and such.

In practice, then, if one were to have the outlet equal to any possible inlet, the wires would have to lie right on the earth. But this is impracticable, as the lines would be short-circuited and useless for talking and signaling. Therefore, a suitable insulation is necessary for commercial talking purposes. The better the insulation, the less the leakage, the harder for the free charges to escape in good time, and the better the chance for the accumulation of charges of high potential. A good line is in greater danger than a poor one, and needs the good outlet pipe the most. This reminds me of Mr. Watson's ground wire. It is of No. 14 copper and attached to a water pipe. A water pipe is a dangerous and uncertain quantity. The outlet for electrical charges demands a straight wire, large in size and perfect to earth. When one connects to a water pipe he can be certain of a ground. But is he certain of the straight non-inductive path? No. That rusty pipe may be a fine insulator, and our ground circuit might be a mile or so away. The very nature of lightning tells us that it has no time to find a ground a mile away, through crooked pipes and square corners. It would rather jump a few inches through wires and cables. Of course, the ground wire will have some resistance, but it must have very little, with a great carrying capacity. If the ground wire is No. 0, straight, and buried deep in the ground, attached to copper plates, far beneath the butt of the pole, we have a path that offers the least resistance to a passing charge. The arrester, if it is not arranged with more than the real thin mica strip, is the weak spot of the line, and will be attacked first. If this weak spot has not sufficient carrying capacity for that rapidly growing charge, it is plain that another weak spot will suffer.

From Mr. Watson's statement, the lightning struck a wire 150 yards from the cable box. It burned the wire and communicated a great charge to the other wires. These charges possessed a very high potential with respect to earth, and flowed earthward toward the cable box terminals, where existed the weakest spot on the line, the carbon arresters. It is reasonable that such a charge could not escape over the No. 14 ground wire, with its uncertain earth connection. Consequently, the charges passed into the cables, seeking other weak spots to find the earth. Apparently, there were four weak spots in the cable, where the charges could jump to the grounded cable sheath, made by metal hangers and grounded guide wire.

Obviously, the only way to protect a cable would be to put a carbon arrester, with a perfect earth, at the subscriber's telephone, thereby dividing effects with the cable arresters. The cable arresters, being relieved of half the burden, if they had a perfect earth, might unload the charges before they became disruptive. It is easy to conceive that immense charges would be generated in the whole neighborhood of the wire struck. The wire struck showed the most charge by the burning of the fuse springs. It resolves itself into a question of whether it sufficiently carries off all the charges. It would possibly take numerous points of discharge to carry off this discharge, but enough could be placed to do it; but it is not economical.

Underground wires are the only ones safe from lightning. It is impossible for them to allow of any potential between them and earth. A charge cannot exist on an underground wire, caused from static strain of something above the earth, because such a wire is at earth potential, without exactly touching the earth. It can freely be insulated. But a cable underground, attached to overhead wires, would suffer just as an overhead cable.

I once had a case of lightning, which struck an overhead line 6,000 feet from central. The wire burned off, the charge passed back to the exchange through 1,000 feet of overhead wire, 5,000 feet of paper cable, and did no damage, until it struck the wool cable at the main frame of the connecting rack. The one pair of wool was burned clear through to the arrester, where it made a strong flash in an attendant's face. Fifteen feet from the end of the wool cable an explosion occurred, which seemed to weld and melt all the wires of the inner core, twenty-five pairs. It created great havoc, which, however, was easily found and remedied. There was no carbon arrester at the instrument or at the cable box. The only earth it could find was at the central office. The charge would possibly have been taken care of by the arrester had it not found a weak spot in the wool cable. Possibly the arrester could not do its duty, and the charge accumulated and discharged as it did fifteen feet back in the cable. It is safe to say, that, if arresters had been placed at instrument, at cable pole, and at exchange, all in perfect condition, the cable would not have been injured. The four ruptures occurring in the cable in question were weak spots, which could have shunted by proper discharging facilities.

To help the lighting line, numerous arresters should be used at different points along the line. If one existed at each terminal of each lamp, the charges could be conducted off, without damaging the series coils. Such is not economical, and a direct lightning charge is too infrequent to spend the extra money for protection when it does strike. The marlin hanger problem is a peculiar one and not for me to explain. Lightning is as yet not understood, and we can only congratulate ourselves that it does not strike often, or at least, not in the same place twice. I am sure we all agree that Mr. Miller could give us valuable suggestions.

Why is it, in transposing metallic circuits, that it is necessary to turn the wire over the same way all the way through the line in order to get an absolutely clear line? Or, in other words, as the linemen put it, "Go left over and right under" all the way through. I take the position that it makes no difference whether you "go left over, and right under" if other conditions necessary to transposition are complied with. Transposing the line consists simply in throwing one side of the line toward the disturbance, thus reversing the direction of the disturbing currents in a metallic line and balancing it.—P. F. C.

It is not necessary to "go left over, and right under," although it is a good thing to have a uniformity of construction. To balance a line, it is not only necessary to alternately put each line next to the disturbance, but to see that all joints are the same in number or have no resistance, and that the wire on each arm of the circuit is of the same size and resistance. I would not discourage the idea with the linemen. System is all right.

I have a common return system, am bothered to some extent with cross talk, and have tried in several ways to get this off. My return wire is No. 8 copper, and with the exception of two or three spurs, I have used No. 12 iron. I notice the cross talk on the copper when two or three telephones are working. The return wire is free from grounds, and everything is soldered. I have three grounded party lines coming into the exchange, and of course must maintain an office ground. Would this have any effect, and would it better the conditions to run these grounded lines metallic out past the end of the return, and then change to ground through a repeating coil?—C. H. C.

Taking the ground party lines off the exchange ground

would help matters, as it would take from the system just that much cross talk coming from those busy party lines. Removing the ground would not help the matter of exchange cross talk. It sometimes helps electric light and trolley induction, but you do not seem to have that. There is no way of taking the cross talk tendency away from common return lines. If the common return had zero resistance, it would short-circuit all the other telephones, as far as your telephone was concerned. But such a course is impossible. If you short-circuit a receiver with one ohm, or less, you can still hear with it. That is what happens with a return system. The return does not entirely short-circuit the neighboring receivers, hence they hear what is said.

What is meant by a universal toll cord circuit? What is the resistance of the Western storage battery voltmeter, with a range from .02 to 3 volts?

I should say that the resistance of the voltmeter would be small. The instrument that I have used with such a range, from 0 to 3 volts, measured 395 ohms. In the same instrument, the 150-volt scale measured just fifty times as much, or 19,750 ohms. As to a universal cord circuit for toll work, I confess to an unfamiliarity with the expression. I would judge it to mean a cord circuit which connects the lines of the American Telephone and Telegraph Company with the common battery lines of the licensee companies. Such a circuit would require a battery furnishing energy to the common battery subscriber through the windings of a repeating coil, while the local battery side of circuit would simply require the repeating coil winding with its middle contacts connected together by condenser, or by short-circuit.

I have a nine-mile metallic line with ten telephones, and another metallic line seven miles long with eleven telephones. They act exactly the same way. They go "bum" as far as talking is concerned, but can ring as well as they ever did. The ring is strong and clear. You can go in on the line and find it just as clear as it can be—no noise, but when you talk to any of the subscribers, it sounds like the transmitter is decidedly out of adjustment. The funny part of it is that the trouble does not stay long enough to be found. The generators work good as far as I can see, and are clear of the line. The line will suddenly go out for a couple of hours, and then work nicely for several days. I have three lines that went that way yesterday. One goes west, one southwest, and other northwest.—O. A. V., Missouri.

The only points I can make about this case are, first, a bad lot of transmitters, or loosely constructed lines, that is, a bunch of bad connections that leave the line open on one side occasionally. Yet this seems improbable, when you say you can ring good all the time. The weak talking would indicate talking over one side of the line only. Joints might open and close at indefinite periods. The fact that they ring well, and are connected to an exchange, would tend to prove that your connecting circuits are bad. The trouble must be in the switching devices. Those three lines running in divers directions could not have a common trouble, unless it were in the switching devices.

In the enclosed diagram, Fig. 1, what is the path taken by the current that indicates to the operator when a line is busy, upon touching the tip of the plug to the called for line jack? What are the functions of the condensers used in the transmitter and receiver circuits of the operator's set?—J. A. S.

Figure 1 is the cord circuit of the relay system used by the Bell telephone company's licensees. The normal potential of the jack sleeve is positive, or ground potential. When the operator touches an idle jack, no current will flow, because the sleeve is at positive potential, and the tip of the plug also, which gets its potential from the ground at repeating coil quarter No. 1. When the jack of the line is busy, its sleeve has been raised in potential to negative value, caused by the sleeve of the plug, which connects to negative battery through the lamp and 83-ohm resistance. When the jack sleeve at negative potential is touched by the plug tip at positive potential, current will flow from the jack sleeve, plug tip, over tip side of cord through quarter No. 1 to ground. Energy is stored up in the core of the repeating coil. When the tip is removed, this energy, being magnetic, and no longer sustained by flowing current, changes to zero value. When magnetism changes in a core, the coil surrounding it develops, or induces a current of electricity. This current has two paths to flow—one through quarters Nos. 1 and 2, thence through the bridged operator's set; and the other through quarters Nos. 3 and 4, thence through the waiting subscriber's set. Hence, both operator and waiting subscriber hear the test. It is faint when the plug touches, and loud when the plug is withdrawn: The withdrawal causes the commercial test.

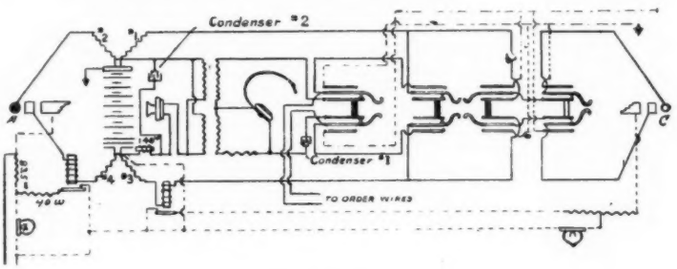

FIG. 1.

The condenser in the transmitter circuit is to balance the effect of the 140-ohm retardation. When a transmitter is put on a twenty-volt battery, an excessive current flows. To prevent excessive current, a resistance has to be inserted. To prevent cross talk, the resistance coil must contain a core of iron to develop the necessary impedance to cross talking currents. With impedance in the circuit, the voice currents are distorted and not intelligible, hence the condenser, which offsets the effect of the iron and turns of the 140-ohm impedance. The condenser is placed in the listening circuit to prevent the operator from receiving a disastrous receiver click upon throwing the listening key.

On page 50 of the January TELEPHONY, you give an account of a freak reading of a voltmeter, which was caused by some wires being damp, but not grounded. According to the circuit described, the different readings were caused by merely reversing the damp wires. Assuming that the dampness was water, then the passing current would liberate hydrogen at one conductor, and oxygen at the other, and as these gases are practically non-conductors, the increased formation of them would cause a corresponding increase in resistance, and a decrease in reading. But by reversing the current, or wires, the gases are produced at the opposite conductors from what they formerly were, and now unite to form water, which decreases the resistance and increases the reading.—J. H. S.

COMPANY GIVES FREE TOLL SERVICE.

Upon the recent completion of its new switchboards, the Home Telephone Company of Richmond, Indiana, gave its subscribers free long-distance telephone service over the United States Telephone Company's lines in its Ohio territory. The above territory includes practically all of Ohio and parts of Michigan, Pennsylvania and West Virginia. The company has just installed new and up-to-date toll switchboards and now has entirely separate apartments for its long-distance business. The boards installed are of the latest and most improved type, which places the company in excellent position to take care of its long-distance business, as neither money nor time was spared in its effort to make its toll system as perfect as possible. Work is now in progress on additional copper toll lines between Richmond and Indianapolis, which will materially improve the service and facilitate prompt handling of toll business going west.

Telephony in Railroad Realms

THE Baltimore and Ohio railroad has gained the distinction of being the first steam railroad to reduce the movement of trains by telephone to a systematized practice, clothed with the best safeguards, as has been the telegraph train-handling system in operation for many years. The use of the telephone in this connection, having been demonstrated to be effective, the management of the road has authorized its officials to avail themselves of this valuable auxiliary upon every occasion that its use will conduce to economy or in any way tend to safely hasten the movement of trains.

A conference of the dispatching forces was recently held at Baltimore, and a set of rules and forms was arranged so as to reduce the method of handling trains by telephone to a standardized system. Charles Selden, superintendent of telegraph, was chairman of the conference, and it is the expectation that every non-telegraph station that has a passing siding will be fitted up with a telephone connection to the nearest telegraph office. This will enable the transmission of train orders from the telegraph office to the train crews at such sidings direct, or to an employe stationed there for that purpose.

For some time the Baltimore and Ohio railroad has been extending the use of the telephone for the transmission of ordinary business messages, connecting the division headquarters with the terminals of the divisions by means of the "composite" telephone method. This system admits of the simultaneous working of the wires telephonically and telegraphically without interfering with each other.

Such circuits have been established between Chicago and Garrett, Indiana, and between Garrett and Chicago Junction, Ohio, thus connecting up the Chicago division; between Newark and Chicago Junction, between Newark and Wheeling, between Wheeling and Fairmont, between Grafton and Wheeling, between Pittsburg and Wheeling, between Wheeling and Holloway, thus connecting the general superintendent of this grand division with the various superintendents and terminals with which he deals. Other circuits have been established from Grafton to Clarksburg, Clarksburg to Parkersburg and from Grafton to Cumberland, thus completing the circuits for the division located at Grafton. There are also circuits between Baltimore and Brunswick, Maryland, and Baltimore and Philadelphia for a like purpose.

In addition to these long circuits the telephone is used extensively in single track blocking and for the movement of yard engines, and the connection of non-telegraph stations with telegraph stations, by which trains are moved from the former to the latter, where the ordinary telegraph orders are received. In this manner the telephone is used for single track blocking between Newark and Bellaire, Ohio. The telegraph offices average about eight miles apart and at many points the siding extends beyond the telegraph office a distance of about two miles. By having the telephone located at the switches, a train is allowed to use the passing siding up to the outlet switch. Then, as soon as the train for which it has been held has passed, the conductor notifies the operator in the block signal tower and he is given permission to proceed with his train to the next block signal office. In this the blocks are practically cut down so far as main track use is concerned, just so much as the side tracks extend into the blocks. In some instances it permits the use of four miles of passing tracks, leaving but four miles of main track to be covered by the blocking. The result is that it practically shortens the block by one-half the distance and hastens the movement of traffic to that extent.

This method of using the telephone between Newark and Bellaire, over 104 miles of single track, has been in use for about two and a half years with great success. It is a system that very much facilitates the handling of traffic and is perfectly safe in the movement of trains.

The Baltimore and Ohio railroad will gradually extend the service to all points on its system where it will be beneficial. It is one of the various improvements being made by the Baltimore and Ohio, that result in thoroughly modernizing the operation of a large railroad system in the interest of the public and the company.

* * *

Aloysius S. Peshong of Dunkirk, New York, has practically completed a system of telephoning from moving trains, it is reported. He says by his method it is possible for a man to step to the end of a moving car and converse with his family as though in his office in the city. He also says trains can be dispatched as safely by his invention as by telegraph. Among the other advantages Mr. Peshong claims his system will have over the telegraph is the fact that the train dispatcher can carry on a conversation at any time with the engineer, and knows exactly what time he is making between stations and could figure accordingly in case of a breakdown to the locomotive or train. He is confident that the railroads will adopt the new system and declares that wrecks on single track road in the future will be reduced to a minimum.

* * *

The Chicago and Northwestern railroad is installing a composite telephone between Boone and Belle Plaine, Iowa. The system is being put in to connect the dispatcher's office at Boone and the round house at Belle Plaine, so that the officials may be in close touch with the men at Belle Plaine at all times. The composite telephone has been winning favor with the railroads for several months and it is being adopted by many eastern lines. The Burlington has been experimenting with the system and the Northwestern will now give it a thorough test. If it proves satisfactory (and its success practically is a foregone conclusion) the system will be extended.

* * *

It is reported from Columbus, Ohio, that the Hocking Valley railroad will erect a long-distance wire along the lines of the road with a view of installing a telephone system similar to the one recently completed on the Lake Shore. There are to be stations at Toledo, Walbridge, Upper Sandusky, Marion, Delaware, Lancaster, Logan, Athens and Nelsonville, Ohio.

* * *

The Gould lines of railroad in Colorado are being equipped with telegraphones, which enable a conversation to be carried on over a telegraph wire without interfering with the sending of a telegraph message over the same wire at the same time. Instruments are installed in cabooses and coaches so that in case of wrecks, communication can be established with headquarters immediately by throwing a hook over a wire and grounding the other end of the wire to the rail or car wheel.

Telephony.

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AMAZING GROWTH OF INDEPENDENT TELEPHONY SHOWN BY GOVERNMENT FIGURES.

THE report just issued from Washington, D. C., by the department of commerce and labor, bureau of the census, on the telephone industry of the country, is undoubtedly the most amazing document of the kind ever circulated by the government, in that the statistics presented on the growth and extent of telephony in the United States are so vast as to be almost beyond intelligent comprehension, and far in excess of any claims ever advanced by those engaged in the telephone business.

When the government sets out to obtain statistics it generally obtains them, and its compilations of figures on any subject or industry may be accepted as being as nearly correct as it is possible for human beings to make them. Knowing this to be a fact, the thousands who are engaged in furthering the Independent telephone movement will be elated at the great prominence given the Independents in this report. Although the figures are for the year 1902 they show that even at that date the Independent companies of the country *in six years' time* had forged ahead of the Bell company, which had occupied the field for twenty-five years! Not even the most sanguine and optimistic among the Independents has ever claimed for the movement the power and numerical strength which the government figures show it to possess.

The facts and figures as set forth by the census bureau are astounding in their immensity, and for the benefit of our readers are published in this issue of TELEPHONY. They should be a source of pride and inspiration to every man, woman and child engaged either directly or indirectly in the Independent telephone business. And when one stops to consider how the Independent movement in the past two years has gone forward by leaps and bounds, the 1902 statistics are all the more astonishing. Enough is shown to prove that if another telephone census were to be taken the present year it would show a growth in the Independent field that would cause even its most ardent champions to gasp and its enemies to quake and grow faint at heart.

If, as the report shows, there were over 9,000 Independent telephone companies in 1902 (the most that TELEPHONY, or Independents in general, have ever claimed up to the present time is 8,000), then to-day there are not less than 12,000 to 14,000 Independent companies doing business in the United States! It is truly remarkable and the government's statement in the case will yet further advance and popularize Independent telephony, and give it a still higher standing in the business and financial world. As showing the growth of the telephone industry since the census of 1880, we quote from the report:

At the census of 1880 the telephone industry was in embryo, few commercial companies being in operation prior to that year. Therefore a comparison of the statistics for the years 1880 and 1902 represents practically the entire growth of a new industry. While the financial interests represented by the industry in 1880 were relatively of great importance, the amounts are comparatively unimportant as compared with the totals for 1902. The number of miles of wire in use in 1902 was 141 times, and the number of telephones nearly forty-three times, as great as in 1880. The number of miles of wire and the number of instruments operated in 1902 by the Independent rural lines, which in 1880 were not in existence, were in excess of the totals for the entire industry in the earlier year.

In 1880 the population of the United States was 50,155,783, and the number of telephones of all kinds reported in that year was 54,319, giving an average of 923 persons to every telephone; in 1902 the population had increased to 78,576,436 and the telephones to 2,315,297, the average being thirty-four persons per telephone. Between 1880 and 1902 the total number of public exchanges increased from 348 to 10,361 and the number of employes from 3,338 to 78,752. The total revenue in 1880 was $3,098,081, or an average of $57.03 per telephone, as compared with $86,825,536, or $37.50 per telephone in 1902. The amount of capital stock authorized in 1880 was $17,386,700, while that for 1902 was $384,534,066, or a little more than twenty-two times as great.

Few, if any, industries have had such a development during the past twenty-five years. The extension of the long-distance service, the introduction of the commercial systems into rural districts, the establishment of Independent rural lines, the development in some instances of such lines into mutual systems with an exchange and more extensive service, and the rapidly increasing use of the telephone in private dwellings all point to a growth of the industry that *can hardly be realized.*

There was great activity during 1902 in the formation of new companies and the consolidation of existing systems. As these changes made it difficult to collect reliable information, especially for the mutual companies and Independent rural lines, it is probable that in some respects the data are incomplete; but the totals may be accepted as an accurate indication of the magnitude and condition of the industry during 1902.

The statement made in a preceding paragraph that the growth of the telephone industry is one that "can hardly be realized" can be better appreciated when it is known that there were in 1902 5,070,554,553 recorded telephonic messages or talks. The report says on this point:

Each telephone company was required to furnish an estimate, based on a peg count, when available, for a given period, of the number of messages or talks over its lines during the year, including all subscribers' talks, toll connections, and long-distance messages, but not "service" messages, talks between telephone officials or employes, or free talks. The total of these estimates amounted to 5,070,554,553, or an average of 2,190 talks per telephone. No estimate could be obtained for the talks or messages over the 4,985 farmer or rural lines. The talks were classed as either local or long-distance or toll.

Regarding the growth of the Independent companies the report says:

These lines have had a wonderful development during the past six years, especially in the north central states—Illinois, Indiana, Iowa, and Missouri containing 3,758 lines of this character, or 75.4 per cent of the total number of such lines reported. * * * The Independent companies include all systems and lines controlled by corporations, companies, or individuals acting entirely independently of the American Telephone and Telegraph Company. In 1902 the Independent commercial and mutual systems reported 1,462,562 miles of wire and 998,119 telephones. In addition, the Independent farmer lines reported 49,965 miles of wire and 55,747 telephones, making a total of 1,512,527 miles of wire and 1,053,866 telephones, as compared with 3,387,924 miles of wire and 1,317,178 telephones operated by the American Telephone and Telegraph Company and its licensees. * * * Of the total number of public exchanges or central offices, the Independent systems operated 6,608, or 63.8 per cent, and the American Telephone and Telegraph Company's systems 3,753, or 36.2 per cent.

The statistics which TELEPHONY has reproduced here form but a hint of the vast array of similar figures that are to be found in the government report on the subject, and we advise every one of our readers to religiously peruse it and profit thereby. This invaluable collection of statistics is, or should be, an obejct lesson to all Independents of what may be accomplished by telephone companies, large and small, in the way of contributing facts and figures in an undertaking of this sort and what may be accomplished thereby in grouping statistics to show the strength of the movement. Let every Independent from this time on aim to do all in his power to aid any enterprise that shall have for its purpose the gathering of figures relating to Independent companies and whose intent shall be the furtherance of the Independent movement. Now that the workers in the great cause know their strength and the ground whereon they stand, let them plan to accomplish still greater things, work unceasingly to carry out the principles that Independent telephony stands for, and share in the golden harvest that awaits.

TELEPHONE AND RURAL TRACTION.

AS ONE travels about over the country he sees constant evidence of activity in interurban railway development. Trolley roads are linking the hamlets with each other and to the cities; the current for running commodious and comfortable cars over long stretches at high speed being given to the trolley wire at trolley wire pressure by generators located at frequent intervals. These generators in turn are driven by current brought at high tension on three small wires from the distant power station, not many such stations being necessary for a long piece of road.

The consideration of these lines is an entertaining study from a social, commercial, or engineering point of view. With the service furnished by the rural telephone and these rural transportation lines, certainly the life of the farm is very different from what it was twenty-five years ago.

Along almost all of the pole lines carrying the high-tension circuits of these rural roads may be seen a copper metallic circuit of bare wire used for telephone connection between the various stations of the system. The use of a telegraph system for handling the service of the road is conspicuous by its absence. Notably, too, the telephone line is uniformly well built, and is in harmony with the general excellence of the equipment. Frequent transpositions, easily discernible by an inspector on a rapidly moving car, keep the line quiet, although it is located within ten or twelve feet, perhaps, of three very high voltage wires, and within half a dozen feet of a 500-volt trolley wire.

When one considers the great outcry which has been made by licensees of the Bell company against a near approach of power circuits of any sort to theirs, the modern object lesson is amusing. Those who use these telephone circuits report everything to be very satisfactory and not interfered with by the peculiarities of their location, and it is believed that it is possible to protect the telephone systems of such a line against damage because of the circuit arrangement, and even to safeguard the machinery in such a way as to make the telephones safe to use.

Perhaps in time the traction engineers may do more than take a leaf from the telephone book, and really write some telephone history from their own experiences.

IMPORTANT SERIES OF FINANCIAL ARTICLES.

IN THIS issue of TELEPHONY appears the first of a new series of articles on the financial status of the Independent telephone movement; its stocks, bonds, and dividends. The subject is treated from the investment point of view, specifically, with positive facts and figures which illustrate and exemplify the text. The author of the series, Mr. William Clendenin, is recognized as one of the leading financial writers of the country, and his articles will be widely read by financial men everywhere, with whom he is an authority.

Every reader of TELEPHONY knows how big and broad and strong the Independent movement is, how virile, how sturdy and how aggressively healthy. Yet this is the first systematic and studied effort to collect the scattered details and remnants of information and reports and tabulate them in systematized and articulated form, adapted to practical and statistical business use.

It is important to the success of this series, and no less important to Independent telephone companies, great and small, to contribute all the information possible to a comprehensive and exhaustive review of the whole subject. Dividend reports, gross earnings, progress figures and development facts generally are coming into the office every day, and it is obvious that every Independent company has a purpose to serve in co-operating with us in this new and vitally significant departure.

The series is an educational series, and to be of value to your company locally in the flotation of new stock or bond issues or increases, the most interesting facts at your disposal should come to us at once. The introductory article in this issue is preliminary and explanatory of the movement. To make it of value to the thousands of Independent companies interested special reference to favorable conditions in each and every locality should be incorporated.

Following Mr. Clendenin's contribution in our present

number succeeding articles will treat of Independent telephone growth and progress in cities and towns graded according to size and according to capitalization. Throughout the question of profits, the problem and facts of dividends, will constitute the prominent feature.

All in all, it is a first effort to help the Independent movement to *complete* independent financial success; to tabulate and present in usable form all the facts, figures and arguments of the most essential and vital element of the Independent telephone movement.

Do not delay to send your facts; all you can as soon as you can. Get the benefits which we know are bound to accrue through these succeeding articles of the series.

THE LIGHT IN THE EAST.

A GREAT light is breaking in the east—a light that has ere this shed its beneficent influence on many other sections of the country where monopolistic telephone conditions have existed, and has always preceded the dawning of a better day, too often long delayed by a greedy, grasping, tyrannical telephone corporation. The light is just now brightest over Gotham, which has tolerated telephone oppression until forbearance has longer ceased to be a virtue. The worm has at last turned; Father Knickerbocker has aroused from his lethargy, and through the medium of the New York press is giving vent to his indignation against the Bell company. With all the righteous wrath at his command he is pouring the vials of his vehemence upon the corporation that has so long had him in its power. And this show of just ire on the part of a great city bodes no good for the object against which it is directed.

New York is at last fully awake to the fact that it has for years been mercilessly bled by the Bell company, and is to-day still being held up in customary Bell fashion, only on a much more pretentious and more piratical scale than ever before. New York having realized this is mad—mad clear through. She longs to cast off the Bell yoke; she sighs for competition, for liberation, for Independent independence, for justice—for revenge! And being possessed of these natural and holy emotions, New York is going about it to accomplish her purpose, insofar as present conditions in that city will permit. She is going after the Bell company through the medium of an investigation—an investigation such as might be made into the character and private life of a hitherto powerful, tyrannical and corrupt political leader finally brought face to face with justice. She will invoke the aid of her legislature to pass laws that shall curb the oppressive Bell corporation in its campaign of extortion and force it to give the city telephone service at somewhere near a reasonable rate.

The remedy to be sought is a legislative enactment regulating the rates of the Bell company. If such a bill could be passed it would undoubtedly have a good effect—at least for a time—of exacting at least a semblance of fair treatment from the Bell. The plan that is forming in New York is to apply for a legislative investigation by a joint committee of the senate and assembly. There is likely to be some difficulty, however (more's the pity), in getting the political leaders to attack so powerful a monopoly unless they could be persuaded that it would be of immediate political advantage to them.

Of the telephone situation in that metropolis and the remedy proposed the New York *Herald* says:

> Use of the telephone by business men has become, because of its almost universal employment, a necessity to all. Because of that necessity it is in effect a public service, being next only in importance to the mails, and should be within reach of all classes. As it is accorded a state franchise and given the use of public streets and roads, its cost to the public should be only that which is consistent with fair earnings on the capital invested, since it is operated for public benefit—hence its privileges—as well as for private profit.
>
> The reverse is the rule, however, all over the country, the policy of the trust being not the reduction of rates when the growth of business at any point reduces the cost of maintenance and operation, but the increase of tolls where public patronage has become so general as to make the telephone a necessity to every up-to-date business house and compel tribute from even the small business man and a large proportion of householders.
>
> The trust policy is one of extortion, to call a spade a spade. It demands increasing prices as the cost to the trust lessens and its necessity to the people increases. New York is a shining example of this "hold up" of the public, where a full service that cost but $60 a year in 1881 has been advanced again and again, until a full subscriber now is bled—that is the right word—to the tune of $243 per annum, not counting all the big and little "extras" that are tacked on to the bill with its $243 charge as a starter.
>
> New York city, with its enormous patronage of the telephone service, should have the lowest rate in the country, according to all honest business rules. One would think astute directors of the trust might argue that it would encourage the growth of the service elsewhere to point to what New York gained by increasing its use of the telephone lines. But if any lesson is taught by the unhappy experience of this unfortunate city it is that promulgated by that distinguished financier, Mr. Ralph Nickleby, who argued that his usurious rates were raised in proportion to the necessity of his schoolboy friends in calling upon him for what he had to furnish.
>
> The present telephone situation in this city is intolerable. There is neither rhyme, reason nor right in the tolls exacted by the trust, and in other cities where competing companies have been started they have knocked the trust charges endwise, and even where expenses of competition with a giant monopoly have been enormous the trust fighters have reduced tolls enormously and still made a snug profit for themselves. An excuse that prevailing prices here are a necessity to fair earnings is all tommy rot.
>
> The *Herald* publishes to-day the result of its exhaustive inquiry into telephone conditions here and elsewhere, and it places reliable information before the local public that the latter may see and fully comprehend how it is being mulcted by the trust—how it is being outrageously overcharged in comparison with other cities.
>
> Whether the situation will be more quickly bettered by telephone competition or by legislative relief it is for the public to decide. But that something should and must be done to relieve business and residential New York from the long prevailing telephone trust oppression is the universal popular opinion.
>
> The *Herald* furnishes fairly and impartially the facts. Now let the people study them and then do something.

The "exhaustive inquiry" referred to above was made by the *Herald* to show the people of New York city to just what extent they were being robbed by the Bell, and how far that metropolis is behind other cities of the country, where the Independents have gained a foothold, in the matter of telephone rates, service, equipment, and all else that goes to make up a first-class, modern telephone system, established and conducted for the purpose of giving the public satisfactory service at a "live and let live" figure, coupled with courteous treatment and a disposition to be fair in business dealings. The *Herald's* statistics startled all New York and were the most severe rebuke ever administered to the Bell in New York state—in all, the strongest possible plea for the curbing of that greedy corporation in New York city and for the speedy introduction of competition into the situation. The *Herald* further says in another editorial on the same subject:

> Should the legislative scalpel be applied to the telephone trust in New York state it would be the second inquiry of the kind in the history of that monopoly. But something like seventeen years have passed since Senator Ainsworth's committee held its inquiry in this city, and since then one of the most powerful and oppressive of all monopolies has enjoyed immunity from legislative inquiry. During those years what was then a comparatively small, though an exceedingly progressive, coroporation has expanded into a commercial octopus, fastening its tentacles upon every city and hamlet in America and wringing its tribute from each.
>
> Yet, comparatively small as was the Bell telephone monopoly in 1887, the report of the legislative committee of that year uncovered a mine of interesting information and led to not a little remedial legislation. It is not commonly known even now, however, that a far more drastic report than the one made public was previously adopted by a majority of the members of the Ainsworth committee, and that the reconsideration and final suppression of that original report enriched the campaign fund of one of the great parties in the sum of $150,000. It has never been charged that an individual member of that investigating committee profited personally one pennyworth from the transaction. Some of the men who

consummated the deal are now dead. Others of them, and some who yet stand high in the party councils, could tell if they would how committeemen who probably would have scorned a personal bribe yielded to an appeal made in the interest of the party's need, and, stultifying their better judgment, assented to a less radical finding.

A thorough investigation of conditions in New York would doubtless develop startling facts and show reasons for immediate legislative interference with the Bell company. But it must be made by a committee that cannot be bought off. A fearless investigation by honest men of the Bell and its methods in New York and legislative action in accordance with the findings of the committee would mean the beginning of the end of the Bell's oppressive rule in Gotham, the emancipation of that city from the Bell company's tyranny, and the paving of the way for the Independents to enter New York and wipe out the disgrace of telephone monopoly with its attendant piratical business methods.

FINANCIAL STRENGTH OF INDEPENDENTS RECOGNIZED BY BRADSTREET'S.

THE importance, stability and permanence of the Independent telephone movement are to be recognized by one of the greatest financial agencies in the United States in a manner that will not only further the cause to a marked degree, but will give the Independent companies of the country a place and standing in the financial world that, though long ago merited, they have not hitherto enjoyed to the extent that they should. If there has existed the shadow of a doubt among financiers and investors as to the breadth and success of the Independent movement as a whole, it is sure to be dispelled when thousands of Independent companies, heretofore only locally known, are exploited through the agency of a financial institution which is an absolute authority in the field it covers. In short, the Independent companies of the country are to be rated in Bradstreet's—that is, as many of them as shall do their share in the simple scheme which we shall outline.

It is through the influence of TELEPHONY that the Independent companies will be given their proper place and rating in Bradstreet's. This great concern has, up to the present time, been unable to secure a satisfactory list of Independent companies, and for this reason only a comparatively small number are to be found listed and rated in its mammoth reference work. TELEPHONY, realizing the importance of having the thousands of Independent properties given an established place in Bradstreet's, has made arrangements with this agency to furnish it with as complete a list as it is possible to obtain. Out of the 8,000 odd Independent companies in operation in the United States it would seem that at least fifty and possibly seventy-five per cent would gladly respond to TELEPHONY'S request and forward to this paper, through the medium of blanks which have been sent out to each, the information asked for. The blanks to be filled out are simple, but will serve the double purpose of furnishing data both for TELEPHONY'S forthcoming directory of the Independent telephone companies of this country and for Bradstreet's.

Should any company have been slighted in the matter of receiving one of these blank forms, the same may be had upon application to this office, or the financial statement of the company may be sent in in ordinary form and it will as well serve the purpose of getting the company a place in Bradstreet's. There is no cost connected with this proposition and TELEPHONY'S only motive in the matter is to advance the cause of Independent telephony, and to give each and every company in the field its merited financial position in the business world. It is a huge undertaking and one to which is attached no small expense, but if the Independent movement is advanced by its efforts and the 8,000 companies now successfully operating are in anywise benefited by the recognition given them by Bradstreet's, then TELEPHONY will have been amply repaid for all its time and trouble in the matter. The opportunity is one that no exchange owner or manager can afford for a moment to overlook. It marks the beginning of a new financial era that is to bring to the Independent companies full recognition among financiers, and a consequent golden harvest to those engaged in the work of spreading the gospel of Independent telephony through the medium of their dollars. It further means a boom for Independent telephone bonds, which of late have rapidly come to the front and are being recognized as among the leading securities on the market. To win the full confidence of the public is an accomplishment of which any business man, concern or enterprise may be justly proud, and this the Independent telephone companies of the country have done in the largest measure.

The future, indeed, looks bright for the Independents, and particularly as relates to the financial feature of the movement.

A LETTER WORTH READING.

FOLLOWING its usual methods of misrepresentation, the Bell Telephone Company is sending out broadcast pamphlets attacking Independent interests in general, and endeavoring by false statements and juggled figures to throw discredit on Independent telephone securities. This matter is so well covered in a letter from Col. Frederick S. Dickson, president and general manager of the Cuyahoga Telephone Company of Cleveland, Ohio, to A. A. White of the Automatic Telephone Company of Bangor, Maine, that TELEPHONY freely quotes from the same, knowing that the many good points Mr. Dickson makes in his exposè of Bell methods will interest all those engaged in Independent telephone work, and by forewarning those who are unacquainted with Bell tactics (there are a few left) may succeed at some future time in heading off this discredited corporation in some of its underhanded work. Excerpts from the letter follow:

My Dear Sir:—I have your favor of the 9th inst. enclosing the Bell Company's pamphlet on "Telephone Companies of Cleveland." I notice this sermon is credited to the "Bulletin of the League of American Municipalities." I presume it was printed there as an advertisement at so much per line. This is a common mode of procedure with the Bell company, and the Omaha *Bee*, or some other obscure busybody, is selected to comment upon the value of investments in corporations operating thousands of miles away, and about which none of its readers has ever heard before, or even knows of the existence of the companies criticized. * * * In taking such a course the Bell officials are clearly deficient both in common honesty to the public and a sense of humor as well. There is another peculiarity in the Bell policy. It attacks an Ohio company in Maine, but never in the home of the company which is the object of attack. It knows possibly that its misstatements would be too easily corrected if given publicity in the home town of the corporation. So an Independent company in Portland Maine, may be condemned in Portland, Oregon, but never in Portland, Maine, on Casco Bay; nor the company in Portland, Oregon, on Puget Sound.

The Bell company printed gleefully my first report on the condition of The Cuyahoga Telephone Company and distributed it through Kentucky and Tennessee, and even farther south. I did not answer its misstatements, as they did me no harm, except by doing what I could to make this corporation a money-making concern. You will notice that the Bell company quotes our figures freely, but gives none of its own. We make it a practice to tell the public monthly what we are doing. The Bell never tells at all. We are not ashamed of *our* figures. Is the Bell of its?

The Cuyahoga Telephone Company was five years old on Monday, the 9th inst. On January 9, 1899, we cut over just forty-six telephones acquired from the old Home Telephone Company, whose successors we were. On February 29, 1904, we had 10,260 telephones! On the fifth of March following our new switchboard went into service, and for the first time we were able to give as near perfect service as is possible. On the 31st of December, 1904, we had 14,370 telephones, an increase of 4,110 in ten months, with an increase in the annual earnings of $106,410.50. The best month of the ten was the last one, December, when our net gain in telephones

was 659, giving us an increase in annual earnings of $18,060.25. I don't know accurately how many telephones the Bell company has in Cleveland, for, as you know, it is not its policy to take the public into its confidence, and when it does tell anything, it is not apt, I think, to be the truth. Maybe it *sometimes* tells the truth. I don't know. Look at its book—on January 1, 1904, it contained 156 2-3 pages. The October book had 159 1-2 pages—an increase of only 3 2-3 pages, with a total increase of 259 names for nine months' work! Its average is 97.12 numbers on a page. We find in our experience that the telephones are about .16 in excess of the names, so that, on this basis, the Bell company had in Cleveland on October 1, 1904, 17,910 telephones. They claim something over 19,000, and that is about as near as they ever get to the truth. * * * I think to-day we can claim in round numbers about 14,500 telephones and the Bell 17,500, for they are actually losing instead of gaining at this time. This is merely an opinion, however, as they have published no directory since October last. This fact is in itself significant, for if a company is not gaining many new telephones it is not necessary to publish new directories. The old one is good enough.

I am sorry that Bell people did not approve of my suggestion that a dividend will be earned on all our stock the coming year and undoubtedly paid on the preferred. I am sorry I think so, if such thoughts annoy the Bell people, but still I can't *help* thinking so, and every month that passes only makes me think so the more.

The bond officer of a Pittsburg trust company, owning a goodly block of Cuyahoga bonds, was in my office yesterday in search of information. I gave him all he asked for, and maybe a little more. Incidentally I observed that The Cuyahoga Telephone Company would probably earn this year a surplus of $120,000 above interest and taxes. He smiled and said, "Well, I will have to believe that, because when I was here a year ago you told me your company would earn a surplus of $60,000 for $1904." I handed him the statement for eleven months of 1904 and it showed a surplus of $63,524, so I was still a little ahead and had yet another month's surplus to add to it. I have tried to be honest and conservative in my estimates, and thus far I have promised nothing that I have not made good. My expectations for the coming year may seem to be "ridiculously exaggerated" to my Bell friends, but all the same I believe those expectations will be accomplished facts a year hence.

For the sake of the Bell people I am very sorry that I can't expend sixty per cent of my earnings for my expenses, as they insist that I should. For the first eleven months of this year the percentage was a little less than 31 1-3. I could and would decrease that to something below 30 per cent, only this coming year I intend to spend a somewhat generous amount in getting additional subscribers and another generous sum in letting the people know through the newspapers why Cuyahoga service is better than the Bell service, and why Cuyahoga rates are cheaper than Bell rates. Then, too, I know I will have to spend extra money on extra directories. Growing as rapidly as we are now, four directories a year will not be enough to serve our people properly. We believe it is good economy to spend money generously to secure proper service.

Our Bell friends are righteously indignant because The Cuyahoga Telephone Company is not willing to permit the city authorities to regulate its rates when the courts decided that the municipality had no right to do so. This indignation is curious and a bit humorous when one reflects that the Bell franchise is entirely free from any such restriction. They seem to think that the municipality should regulate our rates and let theirs alone. I have tried to figure out what reasonable rates might be under varying conditions, but have failed to arrive at a satisfactory conclusion. As the city grows and its business increases the number of telephones must likewise grow or else business will not be properly taken care of. When the exchange gets big the rates must advance at least a little to keep up the proper relation between earnings and expenses. This is a reasonable policy. The Bell company has done just the reverse of this in the past. When it had about 4,000 telephones in Cleveland, it charged $120 a year for a main line business telephone, but when it increased its telephones to 16,000 it reduced its rate to $84 a year. Maybe competition had something to do with this. Its only policy in the past has been to charge all it could get, and only to take less when it could not get more.

"One of the leading bankers and brokers of Cleveland" is quoted as advising his customers to steer clear of telephone securities. No date is given for this interview, but from the quotations made, it was undoubtedly some time ago. The broker is reported as saying, "The last sale of Cuyahoga stock was made at 7½." To-day he would be forced to say that the last sale was at 17½. * * *

I have written a very long letter to you, for which I beg your pardon. Then, too, I have been quarreling with the Bell company and I don't like to quarrel. When such a pamphlet as the one you enclosed in your letter is handed to me (and I get many of them) I read it and smile, and instead of spending my time replying to it, I use my time trying to better our service and increase our business. The best way, I have always contended, to fight the Bell is to give the people better service at lower rates, and thereby do more business than they do, in consequence. I am going to try to put in 6,000 additional telephones this year and I believe I will do it.

NATIONAL AND INTERSTATE ARE MERGED.

THE committees representing the National Independent Telephone Association of America and the Interstate Independent Telephone Association of America, met, in pursuance to call, at the Claypool hotel, Indianapolis, Saturday, January 21, and agreed upon a consolidation of interests, to be known as the National Interstate Telephone Association.

The constitution embodying the principal features of both organizations was unanimously adopted, which provides for organizing the various states and districts on a delegate basis, one delegate to be elected by the state or district associations for each ten thousand units represented in their associations.

The committee of five from the National Association (composed of James B. Hoge of Ohio, W. D. Barnard and J. G. Splane of Pennsylvania, Col. J. D. Powers of Kentucky, and Ed. L. Barber of Ohio) and a like committee from the Inter-State Association (composed of Theodore Gary of Missouri, L. L. C. Brooks of Minnesota, C. E. Hull of Illinois, E. M. Coleman of Kentucky, and H. A. Barnhart of Indiana) are to continue as an executive committee for the new organization until the next convention (at which time the full set of officers will be elected), they agreeing that full authority to handle the organization, under the provisions of the constitution adopted, and arrangement of all matters of detail pertaining to the new organization, shall be left to a committee consisting of James B. Hoge and Theodore Gary.

This committee met, immediately following the adjournment of the joint committee, and decided to push the organization of the various states and districts, as rapidly as possible, it being their desire to get a complete organization of the Independent interests of the country, and arrange to hold the next convention in Chicago, on June 21, 22 and 23

The new National Interstate Association is the logical solution of the association problem and brings all Independent telephone men into one broad organization that will work for the common good. From plans outlined the Independents will have one of the strongest organizations in the United States, harmonious and powerful, able to cope with any situation, and working along lines that will make its influence felt in every state in the Union. Every branch of the telephone industry will be benefited by the new association, and its plans, if carried out on the broad lines contemplated, will have the unqualified support of every man interested in the Independent movement.

EDITORIAL ETCHINGS.

The business pace is the telephone pace.

The telephone is a powerful means of enlightenment.

The telephone is as essential to business as food is to the stomach.

If you want to get there just before the other chap—the telephone.

The telephone goes hand in hand with modern civilization, and in many instances precedes it.

The development of American industry in the last twenty-five years finds no better illustration than the growth of the telephone companies.

The public will pay a fair price for a superior service or article of any kind, which accounts in a large measure for the great success of the Independent movement.

Government Telephone Statistics

Compiled by Department of Commerce and Labor, Bureau of the Census.

THE act of Congress of March 3, 1899, was the first law to provide for an inquiry concerning telephone systems. While no specific reference is made to the telephone industry in the law providing for the census of 1880, the reports of that census present statistics for telephones. No statistics for the industry are given in the census of 1890. Therefore, all comparisons to illustrate the development are necessarily based on the census of 1880.

The statistics presented herewith are taken from the advance sheets of a report compiled by the department of commerce and labor, bureau of the census, of which S. N. D. North is director, the work of compiling this vast array of facts and figures being credited to T. C. Martin, expert special agent. They are for the telephone business as conducted during the year ending December 31, 1902, or the business year of the companies which most nearly conformed to that year. The following summary for continental United States indicates the magnitude of the telephone industry and the remarkable growth of the Independent movement.

Number of systems	4,151
Miles of wire	4,850,486
Salaried officials, clerks, etc.:	
Number	14,124
Salaries	$9,885,886
Wage-earners:	
Average number	64,628
Wages	$26,369,735
Capital stock and bonds outstanding, par value	$348,031,058
Common stock	$269,180,076
Preferred stock	$4,869,621
Bonds	$73,981,361
Total revenue	$86,825,536
Operating expenses and fixed charges, except interest on bonds	$61,652,823
Interest on bonds	$3,511,948
Dividends paid	$14,982,719
Net surplus	$6,678,046
Total assets	$452,172,546
Construction and equipment (including telephones)	$366,561,694
Real estate	$22,716,538
Stocks and bonds of other companies	$9,938,342
Machinery, tools and supplies	$9,689,691
Bills and accounts receivable	$30,629,677
Cash and deposits	$12,291,840
Sundries	$344,764
Total liabilities	$452,172,546
Capital stock	$274,049,697
Bonds	$73,981,361
Cash investment, unincorporated companies	$6,161,299
Bills and accounts payable	$44,302,999
Dividends unpaid	$188,067
Reserves	$31,029,628
Sundries	$1,124,265
Surplus	$21,335,230

This table does not include the statistics for the Independent farmer or rural telephone lines or for the telephone lines owned and operated by steam and electric railway companis.

Although the commercial telephone has developed entirely during the past thirty years, comparisons show that it is now of vastly greater importance than the telegraph. In 1902 the telephone systems operated 78.6 per cent of the wire mileage of the country, gave employment to 70.7 per cent of the wage-earners, paid 65.5 per cent of the wages, received 68 per cent of the total revenue, and paid 67.8 per cent of the total expenses reported for both telephones and telegraphs.

In compiling the statistics for telephony each system—comprising all the telephone lines, exchanges, and toll stations owned and operated by any individual, collection of individuals, firm, or corporation—was considered as a separate unit, and was required to make a separate report. Companies organized to finance operating companies or to control them by the ownership of the majority of the stock, but not engaged in actual operation, were not reported. The American Telephone and Telegraph Company and its forty-three licensees were counted as forty-four separate systems. The reports for the forty-three licensee companies were credited to the states in which their operating headquarters were located, and the long-distance system operated by the American Telephone and Telegraph Company was credited to New York, its operating headquarters being located in New York city. In cases where the same company operated exchanges in more than one state, the combined reports for all of its exchanges were counted as one system, but a separate report was obtained for the equipment and business of the exchanges in each state, so as to give proper credit to the respective states.

The statistics are shown separately in this report for three classes of telephone systems, as follows:

1. Commercial systems, including all systems operated by individuals, firms, or corporations primarily for revenue.

2. Mutual systems, including all systems operated through a mutual arrangement between the persons deriving benefit from the service, primarily for the benefit of the owners, revenue being incidental to the operation of the line.

3. Independent farmer or rural lines having no regular exchange or central; these lines are often operated under conditions similar to those controlling mutual systems.

Mutual systems are frequently the outgrowth of farmer lines, and commercial systems are frequently developed from mutual systems.

There are many telephone lines of a purely private character operating in the same building or connecting two or more buildings or places of business; no attempt was made to enumerate lines of this character.

The following table shows, for each of the three classes, the number of systems, miles of single wire, and number of telephones (not including any instruments employed by the systems exclusively for their own use) in continental United States in 1902. These items constituted the only information obtainable for the Independent rural lines:

	Total.	Commercial.	Mutual.	Independent rural lines.
Number of systems and lines	9,136	3,157	994	4,985
Miles of wire	4,900,451	4,779,571	70,915	49,965
Number of telephones	2,371,044	2,225,981	89,316	55,747

Exclusive of Alaska, Hawaii and the Philippines, there were in operation at the end of 1902, 9,136 telephone systems and Independent lines, having 4,900,451 miles of single wire and 2,371,044 telephones.

Of the total wire mileage, the commercial telephone systems operated 97.5 per cent, the mutual systems 1.5 per cent, and the Independent farmer lines, 1 per cent. Of the telephones, the commercial systems reported 93.9 per cent, the mutual systems 3.8 per cent, and the Independent farmer lines 2.3 per cent. The population of continental United States in 1902, as estimated by the bureau of the census, was 78,576,436, giving an average of one telephone to about every thirty-three inhabitants.

In addition to the foregoing reports were received for one system in Alaska, one in the Philippines, and seven

in Hawaii, reporting in the aggregate 5,518 miles of single wire and 2,891 telephones.

The following table is a summary of the statistics for commercial and mutual telephone systems (exclusive of Independent farmer or rural lines):

	Total.	Commercial.	Mutual.
Number of systems	4,151	3,157	994
Miles of wire	4,850,486	4,779,571	70,915
Number of subscribers	2,178,366	2,089,846	88,520
Stations or telephones of all kinds	2,315,297	2,225,981	89,316
Number of public exchanges	10,361	9,419	942
Number of private branch exchanges	7,883	7,883	.....
Number of automatic pay stations	32,477	32,459	18
Number of all other pay stations	48,393	48,009	384
Number of party lines	258,166	248,908	9,258
Number of stations on party lines	886,152	808,571	77,581
Switchboards, total number	10,896	9,954	942
Manual—			
Common battery	837	830	7
Magneto	10,005	9,071	934
Automatic	54	53	1
Messages or talks during year, total number	5,070,554,553	4,971,413,070	99,141,483
Local exchange	4,949,849,709	4,851,416,539	98,433,170
Long-distance and toll	120,704,844	119,996,531	708,813
Salaried officials, clerks, etc—			
Number	14,124	13,958	166
Salaries	$ 9,885,886	$ 9,871,596	$ 14,290
Wage-earners—			
Average number	64,628	63,630	998
Wages	$ 26,369,735	$ 26,206,065	$163.670
Capital stock and bonds outstanding, par value	348,031,058	347,366,793	664,265
Common stock	269,180,076	268,518,811	661,265
Preferred stock	4,869,621	4,869,621	.....
Bonds	73,981,361	73,978,361	3,000
Total revenue	86,825,536	86,522,211	[1]303,325
Operating expenses and fixed charges, except interest on bonds	61,652,823	61,371,002	281,821
Interest on bonds	3,511,948	3,511,768	180
Dividends paid	14,982,719	14,981,649	1,070
Net surplus	6,678,046	6,657,792	20,254

[1]Includes assessments.

The commercial telephone companies, which include all systems operated primarily for profit, in 1902 formed 76.1 per cent of all systems, controlled 98.5 per cent of the wire mileage, and 96.1 per cent of the telephones in use, and reported 95.9 per cent of all subscribers. The proportion of the telephone business transacted by the systems operated for convenience rather than profit was very small, although in some states the mutual systems and the Independent farmer or rural lines are of great importance.

There was great activity, during 1902, in the formation of new companies and the consolidation of existing systems. As these changes made it difficult to collect reliable information, especially for the mutual companies and Independent rural lines, it is probable that in some respects the data are incomplete; but the totals may be accepted as an accurate indication of the magnitude and condition of the industry during 1902.

At the census of 1880 the telephone industry was in embryo, few commercial companies being in operation prior to that year. Therefore a comparison of the statistics for the years 1880 and 1902 represents practically the entire growth of a new industry. This comparison is made in the following table:

	1902.	1880.
Number of systems	4,151	148
Miles of wire	4,850,486	34,305
Number of subscribers	2,178,366	48,414
Stations or telephones of all kinds	2,315,297	54,319
Number of public exchanges	10,361	348
Number of employes	78,752	3,338
Capital stock authorized, par value	$384,534,066	$17,386,700
Total revenue	86,825,536	[1]3,098,081
Operating expenses and fixed charges	65,164,771	[2]2,373,703
Dividends	14,982,719	302,730
Net surplus	6,678,046	[1]421,648
Total assets	452,172,546	[2]15,702,135

[1]Sixteen systems failed to report any financial data.
[2]Only 74 systems reported assets.

While the financial interests represented by the industry in 1880 were relatively of great importance, the amounts are comparatively unimportant as compared with the totals for 1902. The number of miles of wire in use in 1902 was 141 times, and the number of telephones nearly forty-three times, as great as in 1880. The number of miles of wire and the number of instruments operated in 1902 by the Independent rural lines, which in 1880 were not in existence, were in excess of the totals for the entire industry in the earlier year.

In 1880 the population of the United States was 50,155,783, and the number of telephones of all kinds reported in that year was 54,319, giving an average of 923 persons to every telephone; in 1902 the population had increased to 78,576,436 and the telephones to 2,315,297, the average being thirty-four persons per telephone.

Between 1880 and 1902 the total number of public exchanges increased from 348 to 10,361, and the number of employes from 3,338 to 78,752. The total revenue in 1880 was $3,098,081, or an average of $57.03 per telephone, as compared with $86,825,536, or $37.50 per telephone in 1902. The amount of capital stock authorized in 1880 was $17,386,700, while that for 1902 was $384,534,066, or a little more than twenty-two times as great.

Few, if any, industries have had such a development during the past twenty-five years. The extension of the long-distance service, the introduction of the commercial systems into rural districts, the establishment of Independent rural lines, the development in some instances of such lines into mutual systems with an exchange and more extensive service, and the rapidly increasing use of the telephone in private dwellings, all point to a growth of the industry that can hardly be realized.

Of the 4,151 telephone systems, 2,271, or 54.7 per cent, were incorporated. Of these incorporated companies, 1,924, or 84.7 per cent, operated commercial systems, and only 347, or 15.3 per cent, operated mutual systems.

Of the total authorized capitalization the par value of capital stock constituted 70.9 per cent and that of bonds or funded debt 29.1 per cent. At the end of the year covered by the reports, 64.1 per cent of the total authorized capital had been issued and was outstanding. Of the total par value of capital stock outstanding, common stock represented 98.2 per cent and preferred stock 1.8 per cent. Of the $14,982,719 reported as paid in dividends, $14,895,857 was paid on common stock. The par value of all common stock outstanding amounted to $269,180,076, and the dividends indicated an average rate of 5.5 per cent.

The total revenue of all telephone systems, from operation and from all other sources, amounted to $86,825,536, or a yearly average of $37.50 per telephone, and of 1.7 cents per message or talk. Of this amount $81,599,769, or 94 per cent, was derived from the actual operation of the systems, and $5,225,767, or 6 per cent, from dividends and interest on investments, lease of lines, etc. The total operating expenses amounted to $56,867,062, or an average of $24.56 per year per telephone. The net income averaged $9.36 per telephone.

Of the $56,867,062 reported for operating expenses, the sums paid as salaries and wages form the principal item, amounting to $36,255,621, or 63.8 per cent of the total. Next in rank is the $13,332,343 shown for maintenance and legal expenses, which includes all expenses for repairs and renewals and legal services. It is difficult to preserve the distinction between renewals and additions, and while additions to equipment, real estate, etc., was required to be reported as a separate item, it is probable that in some instances the amount reported for maintenance and legal expenses included such expenditure. Such blending of the accounts frequently occurs in small extensions of the line when wire is used for both repairs and extensions. The item as reported forms 23.4 per cent of the total operating expenses.

While only 194, or 4.7 per cent, of all telephone systems reported 1,000 telephones or over, yet these 194 systems operated 72.5 per cent of the telephones shown for all systems. The gross receipts from operation for these systems aggregated $71,374,134, or 87.5 per cent of the total for the United States. Their income from other sources was $5,193,807, or 99.4 per cent of the amount of such

revenue. Their operating expenses were $50,806,748, and their fixed charges $7,562,950—89.3 per cent and 91.1 per cent of the respective totals. The dividends paid by these systems amounted to $14,357,918, or 95.8 per cent of the dividends paid by all systems. The surplus for the year reported by these large systems as a whole was $3,840,325, or 57.5 per cent of the net surplus of all telephone systems. But eleven of these 194 systems operated at a loss during the year covered by this report, the total deficit amounting to $217,527, hence the actual surplus for the 183 earning companies was $4,057,852. In the case of all but two of the eleven companies operating at a loss the deficit was due to the high fixed charges, while with the other two it was caused by the payment of a higher rate of dividend than the yearly net income warranted.

The value of the construction and equipment of the telephone systems was $349,287,462, or 77.3 per cent of the total assets; the value of the telephones in use was $17,274,232, or 3.8 per cent; of the real estate owned, $22,716,538, or 5 per cent; of the stocks and bonds of other corporations held by the telephone systems, $9,938,342, or 2.2 per cent. The other assets, consisting of machinery, tools, and supplies, bills and accounts receivable, cash on hand and on deposit, and sundries, amounted to $52,955,972, or 11.7 per cent of the total.

Of the total liabilities, $274,049,697, or 60.7 per cent, represented capital stock outstanding, and $73,981,361, or 16.4 per cent, outstanding bonds; the total for reserves and surplus combined was $52,364,858, or 11.6 per cent; the amount reported for bills and accounts payable, $44,302,999, or 9.8 per cent; the cash investment, $6,161,299, or 1.3 per cent; and unpaid dividends, $188,067, or less than one-tenth of one per cent. Sundry liabilities, representing in many cases the value of telephones, etc., owned by individual subscribers, and also additional cash investment for incorporated companies showing stock or bonds. amounted to $1,124,265, or two-tenths of one per cent of the total.

The rapid development of the telephone industry necessitates a large expenditure for new construction. In order to ascertain the expenditure for such work during a period of twelve months, an answer was required to the inquiry, "Cost of lines, real estate, equipment, etc., added during the year," whether by purchase or by construction.

In some systems an exact separation was not made of the expenditures for repairs, renewals, and extensions, but $51,903,021 may be accepted as a close approximation of the amount expended for new construction and equipment. Of this amount, $7,566,365, or 14.6 per cent, was expended by the systems of New York state, and $6,114,696, or 11.7 per cent, by those of Pennsylvania. In Illinois, $4,472,060 was expended. Ohio, Missouri, New Jersey, and Massachusetts each reported over $2,000,000 added in new construction, and Iowa, Indiana, California, Minnesota, Michigan, Kentucky, and Texas each reported over $1,000,000.

The physical equipment of a telephone system is naturally divided into, first, that portion which may be considered the office division, consisting of the switchboards, engines, dynamos, motors, auxiliary cross-connection boards, magneto generators, ringers, and batteries; and second, the line division, consisting of the telephones, wire, poles, cables, duct, submarine circuits, etc.

The switchboard is the most important feature of the "central," the success of the entire system depending upon its proper operation. Switchboards are classed as manual or automatic. The manual switchboard, which is in more common use, is operated by the hand of the operator, who connects the lines of the two subscribers at the central office by means of a pair of flexible, insulated copper wires or cords, in accordance with the oral request of one of the subscribers. There are two kinds of manual boards, the common-battery or central-energy board, and the magneto board. The former is connected to a battery, either storage or primary, located at the exchange or central, for operating all the subscribers' telephones; in connection with a magneto switchboard there is a primary battery at each telephone box or station. The latter type is still numerically superior. An automatic switchboard is one operated by the subscriber, who by using a device attached to his telephone box makes connection with the line of the person with whom he desires to converse without the intervention of an operator at the "central."

The 5,070,554,553 messages or talks, and the $86,825,536 of revenue derived from the service, evidence the efficiency with which this equipment has been operated. The number of switchboards of all kinds—10,896, exceeded the number of public exchanges by 535. This excess of switchboards is caused, to some extent, by the separate enumeration of a toll or long-distance switchboard and a local board in the same exchange. The magneto switchboards were numerically those most generally used, the 10,005 reported for this class forming 91.8 per cent of the total. The greatest number of common-battery or central-energy switchboards were in use in the state of Pennsylvania, which reported 118, or 14.1 per cent of all boards of this class. The largest number of automatic switchboards was reported from Kansas, where sixteen, or 29.6 per cent of all automatic boards, were in use.

The total capacity of the switchboards was 2,447,403 drops, or an average of 225 for each board, as compared with an average of 200 subscribers, 212 telephones, and 445 miles of wire. The capacity of the switchboard is generally in excess of the actual demands of the service. It should be noted, however, that there is no essential relation between the capacity of the switchboards and the number of subscribers or telephones. There are many party lines and private branch exchanges having but one connection with the central switchboard, and in some sections of the country there are extensive toll lines operated without switchboards; on the other hand in some states provision is made accommodating Independent farmer lines, the stations of which are not included in the reports of the systems with which they connect.

Of the 4,850,486 miles of wire, 2,369,914, or 48.9 per cent, consisted of wire above ground, and 1,690,502, or 34.8 per cent, of wire underground. The remainder consisted of 790,070 circuit miles of wire in overhead or submarine cables. There were, on the average, 231.9 miles of wire in each mile of underground cable, making an average of 116 pairs of wires per cable. The largest amount of underground construction was in New York state, which reported 2,130 miles of duct, 1,571.7 miles of cable, and 392,973 miles of single wire; but Pennsylvania had more duct than New York by 1,988.4 miles. In wire mileage Pennsylvania was second, with 249,246; Ohio third, with 153,677; and Massachusetts fourth, with 148,707. There were eight states and territories which did not report any underground construction.

Of the overhead wire mileage, 2,369,914 miles, or 75.2 per cent, was single wire on pole or roof line, and 780,530 miles, or 24.8 per cent, was in overhead cable. The total length of overhead cable was 8,104.5 miles, so that the average wire mileage per mile of cable was 96.3 miles, making an average of forty-eight pairs of wires per cable. In miles of wire in overhead cable Ohio ranked first, with 114,473 miles; New York second, with 82,967 miles; Pennsylvania third, with 73,670 miles, and Illinois fourth, with 71,251 miles.

The total wire mileage in underground cables was only 9,540 miles. Of this amount 3,267 miles, or 34.2 per cent, was reported from New York state; 1,034 miles, or 10.8 per cent, from Michigan; and 996 miles, or 10.4 per cent, from New Jersey.

Each telephone company was required to furnish an estimate, based on a peg count, when available, for a given period, of the number of messages or talks over its lines during the year, including all subscribers' talks, toll connections, and long-distance messages, but not "service" messages, talks between telephone officials or employes, or free talks. The total of these estimates amounted to 5,070,554,553, or an average of 2,190 talks per telephone. No estimate could be obtained for the talks or messages over the 4,985 farmer or rural lines.

The talks were classed as either local, or long-distance and toll. As reported, the local talks numbered 4,949,849,709, or 97.6 per cent, and the long-distance and toll talks 120,704,844, or 2.4 per cent, of the total.

The commercial telegraph messages sent during the year 1902 numbered 90,834,789, or less than one fifty-sixth of the telephone messages, and the pieces of first-class mail matter that passed through the mails during the same year numbered 4,611,271,580, or not quite as many as the telephone messages.

The number of telephones depends upon the density of the population and upon the character and extent of the business and industries of the locality served. The highest number of persons per telephone was 134, shown for Alabama, and the lowest, fourteen for California. Mississippi, North Carolina, and South Carolina had, with Alabama, more than 100 persons per telephone, while Indiana, Iowa, Ohio, and Washington had, with California, less than twenty persons per telephone.

The average number of messages per person for the United States was sixty-five. This average varied from seventeen for South Carolina to 131 for Ohio. The only states or territories besides South Carolina showing an average of less than twenty messages per capita are Indian Territory and North Carolina. In addition to Ohio, the states of California, Colorado, Illinois, Indiana, and Washington show an average of 100 or more messages.

The following table shows the estimated population, the number of stations or telephones, and the average population per telephone for fourteen of the principal cities for which the number of stations or telephones could be ascertained:

City.	Estimated population.	Number of stations or telephones.	Average population per telephone.
New York	3,623,160	93,301	39
Chicago	1,815,445	60,948	30
Philadelphia	1,343,043	46,393	29
St. Louis	599,932	19,228	31
Boston	583,376	30,202	19
Baltimore	523,861	15,181	35
Cleveland	403,032	24,809	16
Buffalo	371,731	12,385	30
San Francisco	351,540	38,031	9
Cincinnati	329,590	13,627	24
Milwaukee	304,965	10,765	28
Detroit	301,670	12,536	24
New Orleans	296,118	7,158	41
Washington	283,551	8,051	35

The telephone systems classed as commercial comprise all systems with a regular exchange or central, or a toll line, which were operated primarily for profit. There were 3,157 systems of this class, controlling 4,779,571 miles of wire and 2,225,981 telephones, or 98.5 per cent of the wire and 96.1 per cent of the telephones reported for all systems.

There were reported by the commercial systems 2,225,981 telephones and 4,971,413,070 messages or talks, giving an average of 2,233 messages per telephone, which was forty-three more than the average for all systems. On the basis of the estimated population of the United States in 1902, there was one commercial telephone for every thirty-five persons, and each person averaged sixty-three commercial messages per telephone.

Indiana reported 261 commercial systems, the largest number found in any one state; Illinois ranked second, with 243; Iowa third, with 241; Ohio fourth, with 236; and Missouri fifth, with 227.

In miles of wire New York state ranked first, with 621,315 miles; Ohio second, with 511,118 miles; Pennsylvania third, with 500,219; Illinois fourth, with 407,357; Massachusetts fifth, with 257,461; and Indiana sixth, with 200,379.

In number of telephones New York state ranked first, with 243,166; Ohio second, with 216,731; Illinois third, with 194,356; Pennsylvania fourth, with 185,089; Indiana fifth, with 122,799; and California sixth, with 106,181. No other state or territory reported as many as 100,000 telephones.

Of the 2,089,846 subscribers to commercial telephone companies, New York state reported 219,745, and Ohio 207,215; all other states reported less than 200,000 subscribers.

The total revenue derived by commercial telephone systems from all sources was $86,522,211, or an average of $38.87 per telephone. Of this amount $81,296,444, or 94 per cent, was realized from the actual operation of the commercial telephone systems. The net income amounted to $21,639,441, or an average of $9.72 per telephone, being somewhat higher than for all systems, $9.36.

Of the total assets of commercial systems the value of the construction and equipment was $347,743,470, or 77.4 per cent; the value of the telephones owned, $16,210,515, or 3.7 per cent; the value of real estate, $22,708,634, or 5 per cent; the par value of stocks and bonds of other corporations, $9,938,342, or 2.2 per cent; the value of machinery, tools, and supplies, $9,657,956, or 2.1 per cent; bills and accounts receivable, $30,610,294, or 6.8 per cent; cash and deposits, $12,271,718, or 2.7 per cent; and sundries, $344,764, or one-tenth of 1 per cent.

Of the total liabilities, the par value of the outstanding capital stock was $273,388,432, or 60.8 per cent; the par value of the outstanding bonds, $73,978,361, or 16.5 per cent; reserves, $31,029,465, or 6.9 per cent; bills and accounts payable, $44,223,572, or 9.8 per cent; unpaid dividends, $188,067, or less than one-tenth of 1 per cent; surplus, $21,271,917, or 4.7 per cent; cash investment, $4,571,318, or 1 per cent; and sundries, $834,561, or two-tenths of 1 per cent.

The telephone systems in large cities are operated under conditions entirely different from those surrounding the systems in small places and rural districts. Accepting a population of 4,000 inhabitants as the line of demarcation between the large and the small places, or the urban and the rural population, the following table shows a summary of the statistics for the commercial telephone systems having their exchanges or centrals in urban and rural districts, respectively:

	Total.	Urban.	Rural.
Number of systems	3,157	530	2,627
Miles of wire	4,779,571	4,361,013	418,558
Stations or telephones of all kinds	2,225,981	1,823,956	402,025
Number of public exchanges	9,419	5,480	3,939
Messages or talks during year	4,971,413,070	4,351,724,325	619,688,745
Salaried officials, clerks, etc.—			
Number	13,958	12,393	1,565
Salaries	$ 9,871,596	$ 9,263,356	$ 608,240
Wage-earners—			
Average number	63,630	56,262	7,368
Wages	$ 26,206,065	$ 24,343,526	$ 1,862,539
Total revenue	86,522,211	79,963,998	6,558,213
Total expenses	79,864,419	75,372,210	4,492,209
Net surplus	6,657,792	4,591,788	2,066,004

While there were 2,627 commercial systems, or 83.2 per cent of the total number, which had their principal exchange or central in rural places, they controlled only 8.8 per cent of the wire and 18.1 per cent of the telephones. Their gross receipts formed only 7.6 per cent, and their expenses, including dividends paid, only 5.6 per cent of the respective totals for all commercial systems. In other words, the systems located in the urban districts do nearly all of the commercial business. The relative activity of the urban and the rural systems is indicated by the fact that the average number of messages per telephone per year was 2,386 and 1,541, respectively. The net surplus shown for the rural systems is, however, in striking contrast

with the other items, being $2,066,004, or 31 per cent of the total for all systems.

The average gross receipts per telephone for urban systems amounted to $43.84, or nearly three times as much as the average for rural systems, which was $16.31 per annum. This wide difference between these two classes of commercial systems is due to the considerably higher rate for service charged by urban systems, because of the greater facilities furnished to the subscriber, the wider field for intercommunication, and the greater expense incident to the conduct of an urban system.

For urban systems the yearly average expense per telephone, including dividends, was $41.32, or nearly four times as great as the average for rural systems, which was only $11.17. Salaries and wages form 44.6 per cent of the total expenses for the urban systems, as compared with 55 per cent of the expenses for the rural systems. But there are many items peculiar to the urban systems—such as underground construction, licenses, franchise charges, special taxes, difficulties in wiring, and the large force required for the supervision of the numerous employes, etc. —which add greatly to the expenses. In some instances an entire rural system is cared for and operated by a man and his family, while an urban system requires a force of both day and night operators, as well as a large force to repair the line, connect and disconnect instruments, etc.

The net surplus for rural systems was $2,066,004, or $5.14 per telephone, as compared with $4,591,788, or $2.52 per telephone for urban systems.

The mutual telephone system is the intervening stage of development between the Independent farmer or rural line and the commercial system. This group includes all systems that have an exchange or central, but are operated primarily for the convenience of the owners and not for revenue. Any deficit in the expense of operation is met, as a rule, by assessments on the owners, and the surplus, if any, is usually expended in improving the system. Extensions are made by connecting with Independent farmer lines or at the expense of the party desiring the service. The systems included in this group had all their exchanges in cities of less than 4,000 inhabitants, and are therefore rural in character.

The growth of the mutual systems has been one of the interesting features of the development of telephony. To assist in tracing this growth, each system was requested to report the year of its establishment.

Accepting the numbers reported for each year as indicating the growth of mutual systems, it appears that between 1881 and 1895, inclusive, there were thirty-seven such systems established, and from 1896 to 1899, inclusive, 212 systems. In 1900 there was a large increase in the mutual ownership, 181 systems being established. But the great increase began with the present century, 269 mutual systems being established in 1901 and 295 in 1902. In 1902 Iowa—probably one of the first states in which a mutual system was established—had 170 systems, or 17.1 per cent of the total number of these systems; 159, or 93.5 per cent, were established between 1900 and 1902, inclusive. There were no mutual systems reported as in operation during the year covered by this report in Arkansas, Delaware, the District of Columbia, Indian Territory, Massachusetts, New Hampshire, New Jersey, New Mexico, Rhode Island, Utah, or Washington.

The mutual systems reported 89,316 telephones and 99,141,483 messages or talks. The number of messages or talks, however, is largely an estimate, and it is possible that the basis for the estimate is more reliable in the case of the commercial systems, it being difficult for the mutual systems to estimate where little or no revenue is derived from the use of the line. The average number of messages or talks per telephone was 1,110 for the year, or a little over three per day for a year of 325 working days. Most mutual systems are open for only a few hours on Sundays and holidays, and only an hour or two each night, while most commercial systems are open all the time; it is, therefore, manifestly unfair to compute daily averages for the two classes of systems on the same basis. A year of 300 working days may be taken as a just basis for mutual systems; on this basis the average number of messages or talks per telephone per day was nearly four.

Considering the figures by states, Iowa had the greatest number of telephones operated by mutual systems—21,355, or 23.9 per cent of the total number operated by such systems. The smallest numbers of telephones for this class of systems were reported from Louisiana and Wyoming, each of which had only seven mutual telephones.

Of the operating expenses for mutual systems, salaries and wages together amounted to $177,960, or 64.7 per cent; maintenance, including legal expenses, $77,384, or 28.1 per cent; rentals of offices and other real estate, $6,138, or 2.2 per cent; telephone traffic paid or due other companies, $5,594, or 2 per cent; rentals on instruments and apparatus, $4,652, or 1.7 per cent; and miscellaneous items, $3,588, or 1.3 per cent.

The construction and equipment of mutual systems was valued at $1,543,992, or 57.5 per cent, and the telephones used at $1,063,717, or 39.6 per cent of the total assets. Of the liabilities of the mutual systems, $1,589,981, or 59.2 per cent, represented the cash investment of the 647 unincorporated systems, and $661,265, or 24.6 per cent, was outstanding capital stock of the 347 incorporated companies.

The telephone lines considered as Independent farmer or rural lines have, as a rule, no Independent exchange; are operated usually on a grounded, though sometimes on a metallic circuit. Many of them connect with the exchanges of commercial systems, and thus, while preserving their independence for local communication, they at the same time secure the benefit of exchange facilities. These lines have had a wonderful development during the past six years, especially in the North Central states—Illinois, Indiana, Iowa, and Missouri containing 3,758 lines of this character, or 75.4 per cent of the total number of such lines reported. Their comparative insignificance, however, made it difficult to locate them and the absence of a controlling representative rendered it almost impossible to secure definite information concerning their operation. Hence, the number enumerated cannot be accepted as the entire number in operation during the year.

The total number of lines operated primarily in rural districts was 21,577. Of this number 15,598, or 72.3 per cent, were lines owned and operated by commercial systems; 994, or 4.6 per cent, were the mutual systems, all of which are rural, and the remaining 4,985, or 23.1 per cent, were Independent farmer or rural lines.

The total length of wire was 259,306 miles, or an average length of about twelve miles per line. The corresponding averages for commercial rural and for Independent rural lines were 8.9 miles and 10 miles, respectively.

The total number of telephones was 266,968, giving an average of about twelve telephones to each line and a little less than one mile of wire to each telephone. The number of telephones per line numbered about eight for commercial rural lines, and about eleven for Independent rural. The length of wire per telephone for commercial rural lines was 1.1 miles and for Independent rural about nine-tenths of 1 mile.

Delaware, the District of Columbia, New Jersey, and Utah are the only states for which no lines of a purely rural character were reported. No mutual rural systems were reported from Arkansas, Indian Territory, Massachusetts, New Hampshire, New Mexico, Rhode Island, or Washington, and no Independent rural lines were found in Colorado, Connecticut, Maryland, Massachusetts, Nevada, New Hampshire, North Dakota, Oklahoma, Rhode Island, or

Washington. It is probable that some small systems of this character were in operation in these states, but it was impossible to locate them or obtain any information concerning them.

The Independent farmer or rural lines are not maintained for profit, and as maintenance is the only cost incident to their operation and as it was impossible to secure any information concerning the cost of construction, no financial data were obtainable. The census inquiry was therefore confined to the length of wire, the number of telephones, and the character of organization.

The first rudimentary telephone exchange was established in Boston, in 1877. The first fully, regularly equipped commercial exchange ever established for public or general service, and as a "central office," was that opened at New Haven, Connecticut, on January 28, 1878. From that time until 1893, when the original patents expired, the American Bell Telephone Company—now the American Telephone and Telegraph Company—practically controlled the telephone business, in spite of occasional attempts at competition in the decade 1880 to 1890. Since 1894 the organization of telephone systems operated independently of the original company has been an important feature in the development of the industry.

The Independent companies include all systems and lines controlled by corporations, companies, or individuals acting entirely independently of the American Telephone and Telegraph Company. In 1902 the Independent commercial and mutual systems reported 1,462,562 miles of wire and 998,119 telephones. In addition, the Independent farmer lines reported 49,965 miles of wire and 55,747 telephones, making a total of 1,512,527 miles of wire and 1,053,866 telephones, as compared with 3,387,924 miles of wire and 1,317,178 telephones operated by the American Telephone and Telegraph Company and its licensees. The commercial systems controlled the larger proportion of the wire and telephones operated by the Independent systems, and their development is the important factor in the growth of the Independent movement.

The Independent systems operated 7,076 switchboards of all kinds, as compared with 3,820 operated by the Bell systems; of the 54 automatic switchboards reported, 53 were operated by the Independent systems.

Of the total number of public exchanges or central offices, the Independent systems operated 6,608, or 63.8 per cent, and the American Telephone and Telegraph Company's systems 3,753, or 36.2 per cent. The Independent systems operated exchanges in all the states and territories with the exception of the District of Columbia and Utah.

The total outstanding capitalization of the Independent systems, including cash investments of unincorporated companies, amounted to $120,921,421, all of which, so far as is known, is invested in the telephone industry.

SECURES INDEPENDENT LINES.

The Independent Telephone Securities Company of Utica, New York, has acquired the control of the Independent telephone exchanges at Cooperstown, Richfield Springs and Hartwick, N. Y., as well as the rural lines of the Otsego Home Telephone Company. The latest acquisition gives the Securities Company control of the largest Independent line in Otsego county, connecting with lines to the northern and southern part of the state. The company is said to have options on other lines in that section of the state and there is a strong probability that the companies mentioned will soon pass into the hands of the company.

The Cooperstown and the Richfield Springs exchanges each has about 250 telephones. The Hartwick system operates nearly 200 telephones, with an exchange at Hartwick. It runs from Fly Creek and Cooperstown and West Oneonta, and has about fifty miles of toll-line. The Otsego Home Telephone Company has about 200 telephones. These will be connected with the exchange at Cooperstown. The systems at Cooperstown and Richfield Springs were organized by Fred C. Ward, who connected the two towns. The Otsego Home Telephone Company was capitalized at $40,000. The business grew rapidly and the property is considered one of the finest Independent lines in New York state. Communication will soon be established between Utica and Index, Hartwick Seminary and Milford, and a line will soon be put in operation between Richfield Springs, Springfield and Cherry Valley.

The consolidation of these companies is a part of a general plan to combine for more effectually competing with the Bell company.

TO DEVELOP IOWA TELEPHONE SERVICE.

Minneapolis capital is destined to play an important part in the development of Iowa's telephone service. Thomas Peebles, general manager of the Mississippi Valley Telephone Company, which was recently purchased for $400,000 by a syndicate of Minneapolis capitalists, recently made a tour of inspection of the company's exchanges, for the purpose of making recommendations for the expenditure of a large sum of money.

"It is our intention to bring the exchanges up to the highest point of efficiency, and to that end we will spend $200,000 at once," said Mr. Peebles. "One of our first improvements will be the installation of a copper circuit between Muscatine and Keokuk. This will be an important step in putting eastern and southeastern Iowa in communication with St. Louis. Other improvements will tend to place other portions of the state in touch with Chicago as well as St. Louis.

"There is a perfect network of telephone lines covering the Hawkeye state, and the number of Independent companies in the field is beyond my computation. There are farmers' exchanges innumerable, and in the counties of Lee and Des Moines I met representatives of many of them. In those counties the farmers have over 1,000 telephones.

"It will be our chief aim to cultivate friendly relations with the other systems to the end that the Independent companies can successfully meet the competition of the Bell people. We will give the cities where we operate a service adapted to their needs, and one that will stimulate growth. Improvement and co-operation are the watchwords in Iowa's telephone field at present and all talk is of the 'get together' variety. Our company now reaches 553 points by toll lines."

As an example of the thoroughness with which Iowa is equipped with telephones, Mr. Peebles remarked a cross-roads point between Keokuk and Alexandria where he found seven different telephone lines, representing as many different systems.

AFTER BUSINESS IN EARNEST.

The Utah Independent Telephone Company recently made an official proposition to the business men of Salt Lake City to eventually inaugurate a party-line service. The proposition was made in writing to the committee appointed at the citizens' meeting held some weeks ago, and was to the effect that the company will reduce the price of its residence telephone, individual line, unlimited and full metallic service, from the present price of $2.50 a month to $2 a month, this price to be maintained until the company shall have 6,000 subscribers connected in Salt Lake City. After that the subscriber shall have the alternative of continuing this service at $2.50 a month or going on a two-party line with unlimited service at $2 a month. It is believed the committee will accept the proposition.

DIGEST OF TELEPHONE PATENTS

Conducted by Edward E. Clement

777,764—D. A. Yoder. Telephone Call Register and Time Indicator.

This invention relates to timing and call indicating and recording mechanism at a central office, to record the number of calls, the total time consumed, during any period, and if desired the individual time of each connection. The object is to record the operators' efficiency records at a point removed from their control. The invention comprises a constantly driven motor mechanism having a definite movement in a given time, a series of time registers, one for each operator or each section, each register coupled up to the motor by a call over any line at its corresponding section or operator's position. For this purpose the control magnet of each register has its circuit controlled through the common return of all the line signal circuits on its section. Combined with the time register for the operator's circuit is a counter showing the number of calls received by that operator, and also preferably the time consumed in making each connection.

In the figure herewith *A* is a constantly driven friction cylinder with a uniform rate of travel. Along and around this are arranged a set of friction wheels *C* normally drawn away from the cylinder, but adapted to be pressed against the same by magnets *C2*. Each of these magnets is connected on one side to the main battery *F* and on the other to the common return of the pilot relay or relays *E* of a particular operator's position or switchboard section. The wheel *C* is thus started by current through the contacts of the pilot relay, in parallel with the lamp. The wheel *C* in revolving works the register *C3*, turning it by means of pins and teeth intermeshing, as long as the wheel turns, that is as long as the pilot relay gets current, which is until the call is answered by plugging in. The wheel *C* carries a graduated disc reading in fractions of time, thus enabling any particular call to be read off as to its duration; but the register *C3* adds all the times.

An ordinary step-by-step register *G* has its magnet *G1* connected in parallel with the magnet *C2*, and a recorder having a large rotating disc of paper with a magnetically controlled pencil, as shown at *I*, also has its magnet connected in parallel, so that a twenty-four hour record may be kept separately. Apparently, however, overlapping calls cannot be separately registered.

777,807—E. E. Ries. Telephone System and Apparatus.

The application on which this patent was granted was filed June 23, 1899. Mr. Ries has done a good deal of work in the way of devising circuits to employ his mercury switch. This is shown in the figure herewith, and comprises a capsule mounted in a receiver, containing contacts and mercury which when the receiver is hanging up falls away from the contacts to open the circuit, and when the receiver is turned sidewise to the ear bridges the contacts. In the first position it may bridge other contacts if desired. As applied in a common battery system, which of itself does not seem to present any features of novelty, the mercury when down breaks the metallic circuit and connects the ringer to ground; while when the receiver is in use it breaks the ground and makes the talking circuit.

As shown in the figure the receiver is constructed like the toy Humpty-Dumpties sold by fakirs. The ends are rounded, and all the weight is in one end, so that no matter how you throw it down it will immediately stand up. A noticeable feature is that it has a four conductor cord.

777,808—E. E. Ries. Telephone Transmitter.

This is a transmitter employing capillary attraction of a liquid for the purpose of changing resistance. Several forms of the apparatus are shown, but the claims are all for the method of operating. A pair of surfaces, like those of two sheets of metal, are brought close together with their edges dipping in the liquid, which rises between them to a height determined by the law of capillarity, and the front surface is vibrated by connecting it with the transmitter diaphragm or by making it respond directly to voice waves as the diaphragm. In one form a front plate like that of the usual type of granular instrument is employed, and in it the diaphragm is fitted with a dished out bridge or back plate, a convex front electrode fitting into the dished out space or cup and the liquid lying therein between the front electrode and the back plate.

The theory is that as the surfaces approach and recede to and from each other the liquid film spreads and contracts in accord with the vibrations of the plate or plates, thus increasing and diminishing the surface and consequently the resistance in the circuit. A statement is made that the retarding effect noticeable toward the end of the swing of the diaphragm is compensated by the increasing rate of change in the surface, which is highest at the moment of greatest retardation.

777,954—G. J. Just. Telephone Chair.

An arm-chair with an extension side support rising from the bottom to proper height, and carrying at its upper end a combination transmitter and receiver. The coil, switch and ringer are on the bottom of the chair, and the idea is to sit down and take it easy while you talk or listen. It puts a premium on laziness.

778,322—J. W. H. Maclagan. Telephone Circuit.

The entire invention in this case can be stated in a short sentence. It comprises a transmitter and receiver in parallel with the primary of an induction coil in a local circuit, the secondary being to line and the battery in the transmitter branch. More simply stated it consists in a receiver bridged across a local battery transmitter circuit. The receiver coil and the primary are of approximately the same resistance.

778,409—O. M. Frykman. Telephone Apparatus.

This is a granular transmitter of the solid-back type having two pairs of electrodes working together and in opposite directions. In the electrode chamber, which is of double the usual depth, the extreme front and back electrodes are fixed, and between them a double-faced movable electrode is supported on a mica diaphragm which divides the chamber into two parts, this intermediate electrode being connected to the diaphragm by a stud which passes through the

front wall of the chamber and the front electrode. The two couples thus formed are oppositely connected through two primary windings on the same induction coil, with the battery in a common return to the middle path. Thus, as the diaphragm and the middle electrode vibrate, the resistance in one side of the chamber rises as that in the other side falls, and as the direction of current in the two primaries is opposite, the changes produce accumulative effect in the secondary.

778,448—J. W. Currier. Tablet Holder for Telephones.

This is a flat sheet metal holder clamped to the side of the telephone box to form a supplemental desk. A paper pad is held on it by thumb screws at the upper end, and a hinged metal cover when turned up exposes a card clamped on its under face, constituting a directory.

778,569—W. W. Dean. Supervisory Apparatus for Telephone Systems.

This is another one of the many emanations from Mr. Dean's prolific mind, directed to the cord circuit. The object is to produce a supervisory relay which will be extremely sensitive, with small resistance and self-induction, so that it can be included directly in a telephone circuit without appreciably affecting voice currents. A coil *h* surrounds the end of the core of a strong electro-magnet whose winding is included in a local circuit with the lamp and its shunt. The small coil is in the talking circuit and its current is controlled by the subscriber.

778,599—J. L. McQuarrie. Telephone Exchange Switchboard Apparatus.

This is a simple scheme intended to get rid of the snappy clicks due to "kick" of the coils in circuit on plugging in. When a subscriber calls the line relay pulls up and not only lights the lamp but also puts a dead short-circuit across the line, which remains there until a plug is in and the cut-off relay has acted. In the diagram 4 is the short-circuit put on by the line relay *C*. In order to prevent a discharge from the battery *b* in the plug circuit through wires 6 to the long spring and through wire 4, with a consequent kick of the repeating coil, another relay *k* in the lamp strand leaves the cord open and disconnects it from the ring of the plug until the cut-off relay circuit is completed. Relay *k* should be sluggish.

Trademark 43,933—Ericsson Telephone Company. Telephone Apparatus.

The word "Echophone" as applied to telephones.

778,877—A. Meinema. Telephony.

This is another of Mr. Meinema's very ingenious and well thought out selective movements for party lines. The patentee refers to his prior patent, No. 757,826, digested in the issue of TELEPHONY for June, wherein he showed a rotatable switch controlling wheel at each substation, carrying a lug stepped around to co-act with a mechanical switch to close the ringer circuit and to permit the closure of the talking circuit. In the present case he provides a latch that temporarily secures the switch parts in the relative positions into which they have been stepped, and an escapement detent between the switch-hook and the circuit changer whereby the hook does not mechanically obstruct the restoring movement of the switch elements, this movement being accomplished by the operator magnetically releasing the latch.

In selecting a station the operator works the key *e2* the proper number of times to set the block *g4* in line with the ends of springs *i-k* and button *1*. She then rings. In the former device the selector could only be restored when the subscribers were through. In the present case it is not necessary to wait, for when the pawl rod *g* is thrown to the left the nose *w1* engages the trigger *u* and opens the talking circuit.

The frame *x* is held over by the dog *z1*, which passes out of the notch shown when the hook rises, whereupon the frame is thrown over.

779,004—C. B. Smith. Multiple Transfer Switchboard.

This application was filed May 8, 1900. A plurality of sections of a switchboard have sets of trunk lines, each with a test wire and each section having one or more sets normally apportioned to it. Switches and signals are associated with the test lines to indicate busy and idle trunks, whereby an operator at one section can test and borrow trunks belonging to other sections. Incidental details are switching mechanisms and a receiver normally bridged across trunk lines, with keys at each section associated with the trunk lines of the other sections to connect with the said receiver.

Design 37,283—G. A. Long. Casing for Telephone Toll Apparatus.

This is an ingenious attempt on the part of the Gray Telephone Pay Station Company to get a cinch on the shield which seems to be now generally accepted as the badge of Independent telephony. Some time ago they got out a toll box in the shape of a bell, and frankness compels the statement that it was ugly. The shield is a handsomer emblem, and by its adoption the Gray company may truly be said to assume a virtue if they have it not.

In this connection it seems opportune for me to emphasize the necessity for the general adoption of a common emblem by all Independents in all parts of the country. The shield is the best known, and is used by a number of the associations as well as by the manufacturers. I am sure it will be a good step to educate the public uniformly to understand that the shield means independence and appropriately protection. Americans are traveling more every year, and uniformity of emblems is for travelers most eminently desirable.

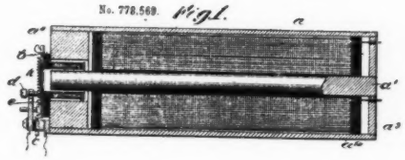
779,443—E. F. Roeber. Telegraph and Telephone Transmission Line.

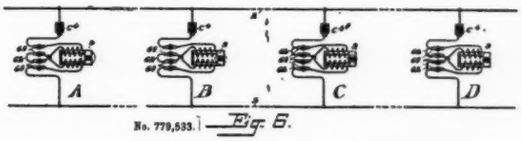
This is a transmission line intended to reduce attenuations, according to the patentee, such attentuations being due to resistance "and regulated by capacity and inductance (but usually stated as due to resistance and capacity)." The gist of the description seems to be in the following statement:

"The essential point of my invention, which represents progress over the prior art, is that I have found a means of constructing a non-uniform conductor having a smaller resistance per unit length than the original uniform conductor by means of suitable coils shunted across the line at certain distances, and, further, that I determined the exact requirements for constructing a suitable conductor for wave transmission having both series and shunt coils placed at certain distances along the line of the equivalent of this arrangement, suitable transformers placed at the same distances along the line.

The subject is mathematically developed, and Mr. Roeber claims that his equations completely solve the problem and enable one to to find by ordinary elementary algebra the characteristic values of the uniform conductor, which is equivalent to a non-uniform conductor of his design. Concerning formulas for the inductance of the coils he refers to the text-books, and to "Grawinkel and Strecker, Hilsfbuch der Elektrotechnik," 1900, page 71.

His first claim reads as follows: "1. In a system of electric-wave transmission, a wave-conductor comprising a substantially uniform line having sources of positive reactance and of negative resistance inserted at intervals along the line, and producing a smaller attenuation of the trans-


No. 778,569. Fig. 1.


A
B
C
D
No. 779,533. Fig. 5.

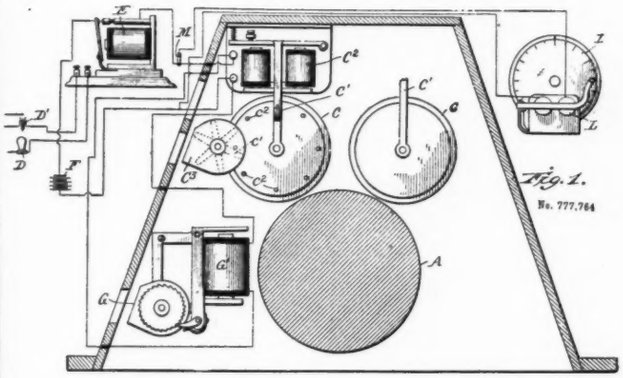


Fig. 1.
No. 777,764

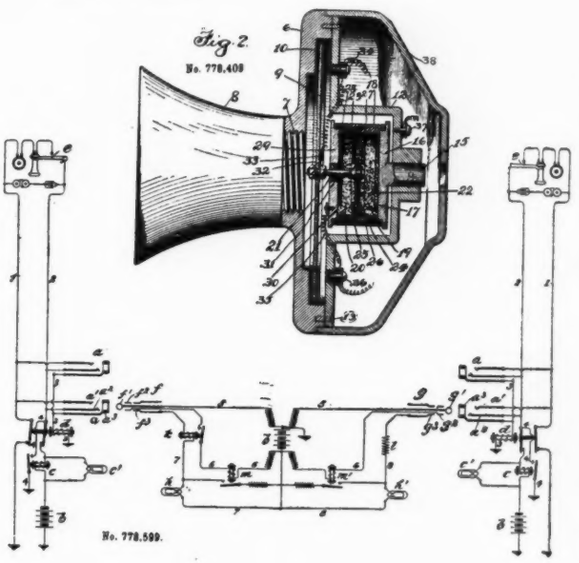


Fig. 2.
No. 778,409
No. 778,599.

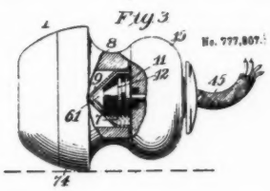
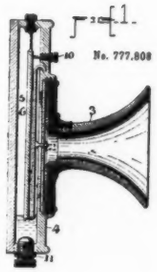


Fig 3
No. 777,807.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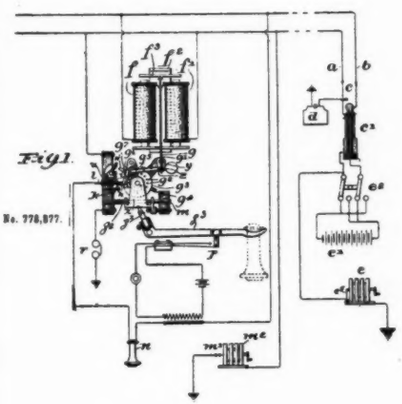


Fig 1.
No. 778,877.

No. 37,283.
INDEPENDENT
TELEPHONE

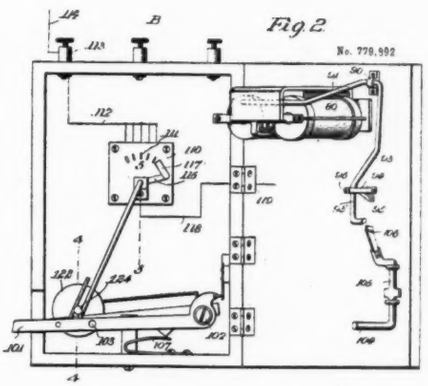
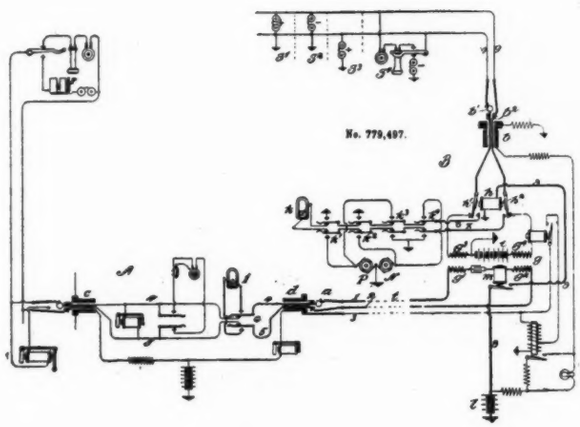


Fig. 2.
No. 779,992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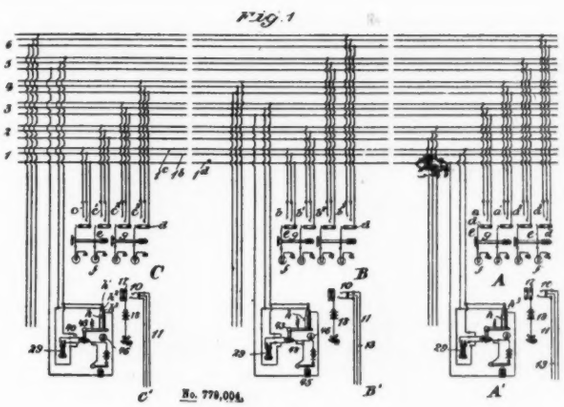


Fig. 1
No. 779,004.

mitted waves than the line without these sources, substantially as set forth."

779,497—W. O. Pennell. Apparatus for Telephone Trunk Lines.

This is a scheme for enabling the subscriber's operator to have control over a trunk of the ringing keys at the trunk terminal board. Selective keys may be employed and are shown, the proper key being set by the trunk operator when she completes the connection, but the connection of these keys to the called circuit being controlled by a relay or magnetic key in a local circuit itself controlled by a relay in the calling end of the trunk, the latter being divided by a repeating coil at the *B* end. Thus when the subscriber's operator rings over the trunk she energizes the relay *m*, which closes the circuit of ringing relay *h*, both at the *B* end. She is thus enabled to supervise and control the entire connection.

779,504—S. J. Seifried. Telephone Bracket.

This is a bracket for a transmitter, or for both transmitter and receiver, which may be secured by a flanged post screwed down on a desk, or by a similar post having an ingenious form of expansion clamp consisting of two hooked bands reaching across the top of a roll-top desk, one band having teeth and the other a tilting latch locked when drawn tight. The bracket arm is hollow, and has a thumb lever on the transmitter end controlling a push pawl taking into the teeth of a fixed circular ratchet on the post, by which the arm is held where set. The transmitter support at the outer end of the arm contains the switch-hook, and is pivoted to the arm, being maintained vertical as the arm is swung up and down by a pair of metal tapes inside, moving oppositely but in parallelism.

The patent is assigned to the Chicago Writing Machine Company, and the claims appear to be all limited by the inclusion of the tapes.

779,533—W. W. Dean. Party Line Telephone System.

Nearly everybody knows about Mr. Dean's so-called harmonic system, which was conceived and designed under romantic circumstances, and unfortunately passed into the wrong hands. It may be classed with Moore's poem, "Lalla Rookh," which was contracted for and a price set on it involving a heavy profit, before a line was written.

The underlying principle of this system is simple, but its embodiment and development shows the skillful hand of the master designer. The bells at the different stations on a partly line are mechanically tuned to four different frequencies, and a governor is applied to a motor driven set of generators at central so that these four frequencies can be reliably supplied to the various operators. Each bell has a reed tongue with a more or less heavy clapper, and a single gong is employed.

This patent is granted upon a point of difference which is alleged to be that which makes the system successful. It is this, that the actual or operative tuning at each station is slightly higher than the natural period of the reed, and the frequencies used correspond to this "overtuning."

Mr. Dean also shows electrical tuning in the above.

779,811—A. J. Springborn. Selective Party Line Telephone System.

This system depends for its operation upon a series of selective devices, one for each substation on the line, and one or more of a somewhat different form at the central office. In order for these devices to always select the particular party with whom connection is desired to the exclusion of all others, the selectors must all move in perfect synchronism. Consequently the inventor uses clockwork mechanism, of the same general type shown in previous patents which I have digested within the past year. A traveling arm depresses contacts set around the dial, and when the particular one is reached which represents the desired station, the bell rings and everybody is happy. If one or two of the selectors happen to be running on central time, however, and the others on eastern time, several unpleasant consequences would probably follow to the operator if the disturbed subscribers could hit back as readily as they can talk back. Mr. Springborn's confidence in this type of apparatus is remarkable, and is apparently born of an optimism uncommon in this matter of fact world, which usually insists on results and not on promises.

Among other devices, the telephones each have a receiver hook, a selecting device of the clockwork variety, a controlling magnet, a zero key, double means for locking the switch-hook, one means controlled by the magnet and the other by the zero key, a local battery or two, and in addition all the other parts that every telephone has.

779,892—W. D. Watkins. Telephone Selecting System.

This is another step-by-step selective party line scheme, with lockout features. A magnet in each subscriber's station works a ratchet wheel which at some predetermined point, different at each station, closes together contact springs in the talking circuit and permits ringing. Reference is made for the preferred form of device to former Watkins' application 121,531. A locking arm is provided, each transmitter having a locking disc, and as the particular station wanted is selected its circuit only is made, and all the other are locked out.

A feature is the provision of a contact arm connected with the receiver hook which sends the number of the station called like a fire alarm wheel.

779,893—W. D. Watkins. Selective Signaling System.

This is a selector device for use in a system of the character above set forth. It comprises a selector disk or wheel with an arm which controls circuit closing springs to make the ringing and talking circuit at the station wanted and to break the same at all the other stations. Two magnets work the wheel, one pulling over a double ended pawl and the other pushing it up to lock the wheel. A latch has a notch to hold the pawl in middle or release position and is controlled by the second magnet.

779,940—F. F. Howe. Support for Telephone Receivers.

This is one of the supports which hold the receiver up to your ear while you are talking, so as to leave both hands free. It consists of a telescoping tube having the end section screwed to a wall plate, and the receiver section swiveled to turn in the wall section. On the movable section is a T arm, which, when the receiver is not held up in use, presses down on the ordinary switch-hook. The receiver is held on the end of the section by a clamp around its heel so its weight may be depended on to turn the section and depress the hook when not in use.

779,982—P. J. Albrecht. Selective Telephone System.

A party line step-by-step selective system. There is common sense in this design, for Mr. Albrecht puts his selective signaling devices all in local circuits and works them by a relay in the main line. The stepping magnet controls a yoke in which the controlling wheel hangs, an escapement governor for the wheel being also hung on the yoke. When the call comes in for a particular station its magnet pulls down the yoke, the wheel starts around; if it reaches the limit it trips a spinning wheel which drops a weight that closes a local circuit which contains the bell that rings, and this is the thing that is liable to happen any time, unfortunately, for the wheels have to move in synchronism, and the inventor depends on it. This is a delusion and a snare. None but the unwary are ever caught that way. (I refer to the principle, not the invention.)

A Successful Town System

Union Telephone Company, California, Pennsylvania.

AMONG the commercial and industrial enterprises of California, Pennsylvania, prominent place must be given to the Union Telephone Company, an Independent organization backed entirely by local capital, managed by local business men, and successful to a marked degree, because filling a public need felt by practically all of the citizens of the place. The local telephone field is excellently served by this company, and a brief outline of its inception and progress will be of interest to the readers of TELEPHONY.

To H. L. Lamb, treasurer of the company, belongs the honor of first discussing the proposition for an efficient and satisfactory telephone service in California. The field was already occupied by the Bell company, which had an exchange in operation there; but the rates were too high, the service poor and limited to a few patrons, and the facilities afforded the public so narrow that the opening for a good local company, representing the people in general, appeared excellent.

W. C. SMITH, PRESIDENT.

The early steps toward organization were taken in March, 1903, when Mr. Lamb outlined his plans to Messrs. T. J. Underwood and W. C. Smith, well known citizens and capitalists of the town, and A. F. Moses of the California *Sentinel* staff. These gentlemen met on several occasions to discuss the idea more fully, and on April 8 a preliminary organization was formed, with Mr. Underwood as chairman and Mr. Moses, secretary. At this meeting a motion prevailed "to organize a company to be styled "The Union Telephone Company," with a capital stock of $10,000, divided into 400 shares of the par value of $25 each." The secretary was instructed to make application for a state charter, application having previously been made for a franchise ordinance in the boroughs of California and Coal Center.

At a meeting of the directors, held June 10, 1903, the secretary reported the receipt of charter, which bore date of June 1, 1903. A permanent organization was then effected, with the following officers:

President, W. C. Smith; vice president, T. J. Underwood; secretary, A. F. Moses; treasurer, H. L. Lamb.

Stock certificates were procured and the company set about the work of interesting local capital in the proposed enterprise. Mr. Lamb took up this branch of the work, pursuing it as time and occasion offered, and was able to report on August 29 that about 160 shares had been subscribed for. This being deemed sufficient as a basis for starting actual construction work, Mr. Lamb was made manager and instructed to procure material and help to push forward the work of building the lines.

H. L. LAMB, TREASURER.

The ensuing few weeks were busy ones for the company. Bids were received for switchboards and other supplies, a force of men put to work and the lines of the company soon began to materialize. Meanwhile the franchises asked for in the two towns had been granted, so that there was no obstacle to the rapid progress of construction.

The exchange was opened for business the latter part of November, 1903, with about fifty telephones connected up. As the work of construction proceeded new connections were made, and by January 1, 1904, about 100 subscribers to the service were reported.

It was already evident that the growth of the company would soon exceed its means to expand in proportion, and that an increase of capital stock would be necessary. Accordingly, the required legal notice of a special meeting of stockholders was published, and the date of April 6, 1904, fixed for the meeting. The progress of the work had been so satisfactory, the finances were in such good shape, and future prospects were so bright that the action of the stockholders was a foregone conclusion, and no one was surprised when it was ascertained that 263 shares had been voted in favor of increasing the capital stock from $10,000, to $15,000, with not a share against it.

At this meeting checks for the first quarterly dividend were issued. The board of directors had previously declared a dividend of 2½ per cent for the quarter ending March 31, it being apparent that the earnings would justify this distribution of profits.

The first annual meeting of the stockholders was held July 5, 1904. The secretary read a statement of the company's finances, as shown by the books on date of July 2, from which it appeared that there was a balance in the operating account of $230, after paying two dividends of 2½ per cent each. Directors were elected for the ensuing year, the number being increased to five, and the following were chosen: W. C. Smith, T. J. Underwood, A. F. Moses, H. L. Lamb, L. Frank Baker. The directors organized later the same day by re-electing the former officers for the ensuing year.

The third quarterly dividend of 2½ per cent was paid October 3, 1904, out of the earnings of the three months previous.

Construction work was steadily pushed forward, new telephone subscribers being constantly added, and on September 28 the directors decided to propose a second increase of capital stock. The usual notice was given to all stockholders. The date set for this meeting was December 1, and when the time came the company voted the increase from $15,000 to $20,000 by an unanimous vote of the 353 shares represented. This additional stock has all been sold for cash, and the proceeds are being used in

A. F. MOSES, SECRETARY.

paying for extensions, improvements and toll line connections. The company is replacing a number of its important leads with cable instead of open wires.

A fourth dividend of the same amount as the previous ones, was paid January of this year, making 10 per cent for the year. There is no doubt that this rate of dividend can be maintained indefinitely, and a handsome balance carried to surplus every year, making the investment one of the finest in the community.

The company is justly proud of its success, as well it may be. Its steady growth speaks volumes for the careful and conservative management of the directors, and the hearty support given the company is evidence that the service furnished is appreciated by all. The company has about 250 telephones in its exchange at the present time, and contracts ahead for many more.

The directors expect at least 300 subscribers by April 1, and that the stock will go to premium before that date. Many stockholders are refusing to sell at par, and say that they want 150 for their holdings.

The switchboard operated by the company was constructed by the American Electric Telephone Company of Chicago, and a majority of the telephones in use are of the same make. The cable and wire used was furnished by the Stromberg-Carlson Company, and the Standard Underground Cable Company. No outside engineering help was employed in the construction of the lines, Mr. Lamb, the manager, giving the work his personal supervision at all stages. All the legal work, such as procuring charter, preparing papers for rights of way, etc., has been done by Mr. Moses, the secretary.

The Union Company's lines extend to Newell, Roscoe, Granville, Hood's Hollow and West Brownsville, at which latter point connections are in progress with the Fayette county Independent system, giving toll line access to a vast number of Independent exchanges east, south and west, including the Pittsburg & Allegheny system, with all its affiliated lines.

The Union Telephone Company is the only Independent company in Washington county, and several of its directors are interesting themselves in organizing elsewhere in the county, with a view to building up an Independent business that will include some profitable toll line work. Mr. Moses and Mr. Lamb are the prime movers in this matter.

The outlook for 1905 is most promising. Construction work is nearly finished, the plant is in first-class shape, the new cable being put in place will greatly increase the capacity of the lines, new subscribers are coming in every week, and the company's finances are in the best possible condition. For the coming year quarterly dividends of 2½ per cent will be paid, and a handsome surplus laid aside for future needs. The Union company's record is one in which every stockholder and citizens of California may take a just pride.

Portraits of the president, secretary and treasurer are herewith presented. They are all highly esteemed citizens of California, and successful, progressive business men, as well as being prominently identified with other leading local enterprises.

William C. Smith, president of the Union Telephone Company, is heavily interested in the Hila Coal Company, the active management of the company's mine falling on his shoulders.

A. F. Moses, secretary, is a newspaper man of experience, and holds the important position of foreman and political editor on the California *Sentinel*, the leading paper of that section.

H. L. Lamb, treasurer, is senior member of the firm of Lamb Brothers, publishers of the California *Sentinel*, and devotes much of his time to the affairs of the Union company.

ROME COMPANY ENJOYING A BOOM.

The Home Telephone Company of Rome, New York, has just completed extensive improvements to its plant. In the last two months 18,000 feet of aerial cable has been strung and inside equipment has been added in order to take care of the general increase of patronage, which the company is receiving all the while. The year 1900 marked the advent of the Rome Home Telephone Company. At that time the city of Rome was served by the Bell with less than 200 telephones and the rates were so high that only a few people could afford them. The public, therefore, demanded a more modern and cheaper telephone service. Under this state of affairs the Home company was organized, built an up-to-date plant, giving a superior service, and reduced the rates fifty per cent, the result being that it was overwhelmed with business. To-day the patrons of the Rome Home Telephone Company have communication with 1,100 subscribers, and since the new addition to the plant have been made, the company expects to increase the present list of subscribers by several hundred. The long-distance lines of the company are being rapidly extended so that to-day it gives service to Schenectady, Albany and Troy on the east; to Syracuse, Rochester and Buffalo on the west; to Lake Ontario and the St. Lawrence River on the north; to the state line on the south, and to almost every available point within that radius.

YOUNGSTOWN COMPANY MAKES EXTENSIONS.

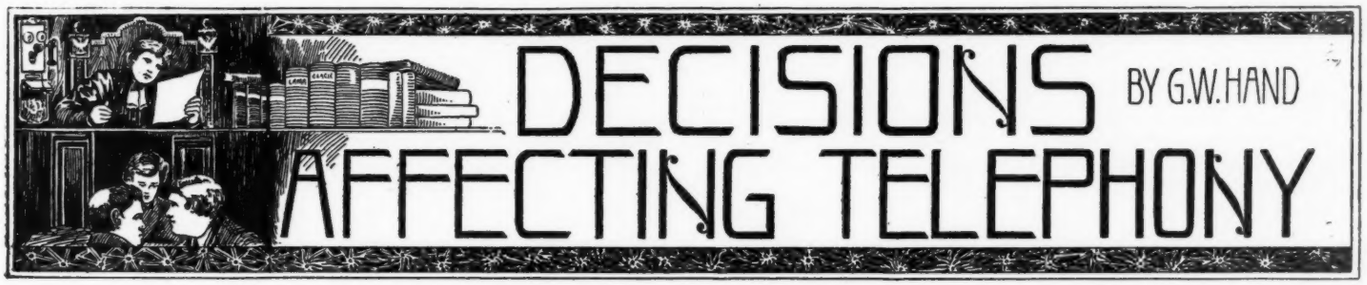
The Youngstown (Ohio) Telephone Company has completed several important extensions to its local telephone service, which puts it in a way to give its patrons better service than ever before. New lines have been built to Sharon and Greenville of No. 10 copper metallic circuits. A private branch exchange has been put into the office of the Youngstown & Sharon Railway Company, and a deal has been closed for a private line to the Bessemer limestone quarries near Lowellville. About ten stations are attached through the exchange in the Youngstown & Sharon office.

During last year the Youngstown Telephone Company put in 800 new telephones, that number being about evenly divided between business and private houses. Quite a number of farmer lines were constructed and several toll lines added to the list, the latter including one to Canfield. The new Sharon and Greenville lines give direct connection from Youngstown to many towns in western Pennsylvania and New York state. A new line has just been completed along the Salt Springs road, which will connect numerous farmhouses with the local exchange. The company closed last year with a total of not less than 3,000 telephones in its Youngstown district.

TELEPHONING A WEDDING.

The following item appears in Washington dispatches a few days ago: "Sitting cozily in her flat in Washington, Mrs. H. L. Van Matre attended the Baltimore wedding of her daughter. Mrs. Van Matre was confined to her room by illness and could not go to Baltimore. The wedding was an elaborate affair with numerous bridesmaids and ushers, and Mrs. Van Matre sat with a telephone receiver at her ear and heard the whole ceremony, including music and prayer. One of the maids of honor also telephoned a graphic description of the scene. By arrangement the ceremony took place near a telephone, and every word was spoken by the clergyman, the bridegroom and the bride as distinctly as possible, so that the invalid mother might hear."

The best service in every relation of company to patron is rendered when both comply with the regulations.



DOES "TELEGRAPH" INCLUDE "TELEPHONE"?

ARE statutes for the benefit of telegraph companies held by the courts to include telephone companies? This question has been submitted by a Kentucky correspondent, and we take the liberty to discuss it in the columns of this department. It may be said as a general rule that an affirmative answer should be given to this question, and the following authorities are cited, together with the point on which each was decided:

The State v. Central New Jersey Telephone Company, 53 N. J. L. 341. In this case the question arose as to the right of a telephone company to condemn land under the authority given to telegraph companies to exercise the right of eminent domain. The justice who wrote the decision said: "I think that a telephone company can be incorporated under the general revised act to incorporate and regulate telegraph companies. To state the proposition differently, I think the operation of a line of wire for a telephone service, by a company organized under this act, is not *ultra vires*. If this be so, then a condemnation for a telephone line is within the power granted by this act."

Attorney General v. Edison Telephone Company of London, 6 Q. B. D. 244. In this case the question was whether the transmission of intelligence by the Edison Telephone Company was an infringement upon the monopoly of the telegraph business previously granted to the postmaster general. The court said that the telephonic apparatus taken together formed a system of telegraphic communication.

The Wisconsin Telephone Company v. The City of Oshkosh, 62 Wis. 32. Here the question was raised whether a telephone company, which was organized under the act incorporating telegraph companies, providing that telegraph companies should not pay a municipal tax, would escape municipal taxation. The Wisconsin Supreme court held that the telephone company had the right to incorporate under the telegraph act and thereby be protected in the exercise of the privileges of the telegraph act.

The Chesapeake & Potomac Telegraph Company v. Baltimore & Ohio Telegraph Company, 66 Md. 339. In this case the second named company was organized as a telephone company. It was contended that under this state of facts the Baltimore company was not bound by the law requiring telegraph companies to receive and transmit messages. The chief justice of the Maryland court said: "It is clear if we take the term telegraph to mean and include any apparatus or adjustment of instruments for transmitting messages or other communications by means of electric currents, that term is comprehensive enough to embrace the telephone."

York Telephone Company v. Keesey (Com. Pl.), 5 Pa. Dist. R. 366. The Pennsylvania courts have said that the act of April 29, 1874, relative to the incorporation of telegraph companies, includes a telephone company. The amendment of May 1, 1876, did not change the law in this respect, nor has it been changed by subsequent legislative enactment.

Franklin v. N. W. Telephone Company, 69 Iowa 9. A provision of the code of Iowa, authorizing suits to be brought against telegraph companies in any country through which their lines pass, was held to apply to telephone companies.

A decision of the Common Pleas court of Luzerne county, Pennsylvania, is authority for the statement that "telegraph" in a statute includes "telephone." This was decided in the case of the Central Pennsylvania Telephone Company v. Wilkesbarre & West Side Railway, 11 Pa. Co. Ct. R. 417.

ONLY NECESSARY TO PROVIDE APPLIANCES IN GENERAL USE.

In a personal injury case before the New Jersey courts in which a company was charged with negligence in failing to safeguard with due care an excavation made by it in a public highway, the trial court was asked to charge the jury as follows: "That the duty of the defendant was to exercise reasonable care in protecting by a fence or guard its manhole, and that it was not, in the exercise of this duty, necessary that it should provide the best appliances or guards, but only such appliances and guards as were well known and in general use." The Supreme court of the state has said that this was a correct statement of the law and on the ground of failure of the trial judge to give this charge to the jury, reversed a judgment rendered against the company.

Van Vechten v. New York & New Jersey Telephone & Telegraph Company, 58 Atl. 1096.

REASONABLE REGULATIONS IN KENTUCKY.

In the Mason county Circuit court of the above state a suit by mandamus was started to compel the Maysville Telephone Company to install a telephone in the residence of one Williams. The facts were as follows: The plaintiff was a doctor living in a rented house in Maysville. He applied for telephone service from the above company and accompanied his request with the requisite fee. The company insisted that Williams sign a contract to retain the telephone for a period of not less than one year and refused to install the instrument unless he would comply with this condition. The case came to a hearing on the proposition that Williams was being discriminated against unfairly, inasmuch as other patrons were receiving service who had not signed contracts to keep their telephones for a year. The Court of Appeals said on this:

"It is not said in the petition that $3 for three months' service and extending the line to his residence and putting in the telephone was a reasonable charge. It is possible and probable that extending the line to his residence, placing the telephone and making the connections would have cost much more than $3, but appellant (Williams) says that the company discriminated against him, for it furnished others with telephone connections for $3. . . . The service to his neighbors might have been under entirely different circumstances. They may have all been on one line—a party line—and the expense to make connection and furnish service may have been small as compared with what appellant required." The court also said on the question of the right to prescribe rules: "It is self-evident that a corporation engaged in a business affected by a public interest may prescribe reasonable rules and charges for conducting its business. And when the charges are not fixed

by legislative enactment (as in the case at bar) the charges may be fixed by the corporation, and the only limitations are that the charges be reasonable, and be the same to all persons under the same or like circumstances or conditions. Tested by these principles, we are of the opinion that the petition did not state a cause of action." The ruling of the court denied Williams the use of the telephone under the facts as he presented them.

The court also said mandamus was not the proper remedy for one so aggrieved under any circumstances and suggested that a mandatory injunction could only be sought in a case like this. The decision is very clear on the general principle of law that the courts will only compel the installation of service against the will of companies when a clear case is made out that there has been a violation of the rule against discrimination.

Williams v. Maysville Telephone Company, Court of Appeals of Kentucky, 82 S. W. 995.

CORPORATIONS HAVE RIGHT TO JURY TRIAL IN CONDEMNATION PROCEEDINGS.

This question was recently discussed in a railroad case in Missouri. The law prior to 1875 made no provision in condemnation proceedings for a jury trial to assess the damages. The constitution adopted in 1875 provides at section 4 of article 12 as follows: "The right of trial by jury shall be held inviolate in all trials of claims for compensation, when, in the exercise of said right of eminent domain, any incorporated company shall be interested." The Missouri Supreme court said that this included railroad corporations and that they were entitled to the benefit of a jury trial in such matters. This ruling applies equally to telephone companies organized as corporations. The court said that the provision was a protection to both the corporations and the people and could be demanded by either in controversies between them.

City of St. Louis v. Roe et al., Supreme Court of Missouri, 83 S. W. 435.

HOUSE MOVER NEGLIGENT—LIABILITY FOR LEAVING WIRES IN DANGEROUS PLACES.

William Hake of Milwaukee left a telephone wire, which he cut while engaged in moving a building, in a position that enabled a child to come in contact with it while at play. Hake after cutting the wire, which at the time was out of use, rolled it into a coil and placed it on a hook near the ground. The telephone wire came into contact with an electric light wire, and while thus charged a child was injured by an electric shock. Suit was brought jointly against Hake and the owner of the telephone wire for damages. The Wisconsin Supreme court said on the question of the presumption of knowledge by the house-mover of the danger in leaving a wire in such careless way:

"In the present day it is a well-known fact that our streets are full of electric light wires crossing and recrossing in every direction, and that some of these wires, especially those transmitting heat or light or power, are charged with deadly currents; and it also is well known that when such a wire is naked, either from having lost its insulation or because necessarily in that condition, like a trolley wire, and comes in contact with another naked wire, the second wire also becomes charged with the current. It requires no college education to know these general facts. Any man actively participating in the affairs of the world, especially in a business which every day necessitates the removal and cutting of wires, as did the defendant's business, must be presumed to know something of the dangers which lurk ever near the handling of such wires. From the very fact of these known dangers he must necessarily be charged with a higher degree of caution and diligence than one who is dealing with sticks and stones which can convey no such concealed death stroke. As has been said, the defendant was a house mover. He necessarily must have known something of the dangers lurking about them, and the possibility of contact with a highly charged wire. We think it was certainly for the jury to say whether in hanging this wire on the side of the Nagle house, within reach of a child, and leaving it there, he was guilty of a negligent act, and an act from which an injury to another was to be anticipated as a natural and probable result."

In the lower tribunal the charge was given that Hake was presumed to know that he was handling an electric wire . . . and that a higher degree of care was necessary when a thing, on account of which an injury may be caused, was a highly dangerous one, and that dead wires may be enlivened or become charged with a current of electricity by coming into contact with a charged wire. Objection was made to this statement of the law on the ground that it required more than ordinary care by the defendant. The Supreme court refused to reverse this rule of the lower court. While the statement of the law was made in connection of an action against a house mover it is equally good law in every circumstance, and it may be generally said that employes and others in handling wires are by law charged with the duty of taking more than ordinary precaution to the end that accidents may be avoided.

Nagle v. Hake, 101 N. Y. 409.

COMPANY CANNOT BE FORCED TO PLACE TELEPHONE IN POOL ROOM.

That the power of the courts in New York cannot be invoked to require a telephone company to supply service to a suspected poolroom is the decision recently given by Justice MacLean of the New York Supreme court, in denying the application of one Weston for a peremptory mandamus to compel the New York Telephone Company to place a telephone in his place of business at 35 West Twenty-seventh street, New York city, and establish telephone connection therewith. The telephone company had twice rejected Weston's petition asking for telephone connection, whereat Weston claimed that his business had been damaged by failure to secure the service. The telephone company submitted an affidavit that it had received communication from the police commissioner of the city notifying him that the premises above referred to had been raided by the police and that either a poolroom or pool exchange had been conducted there. There had been a contract with the previous occupant, and when Weston applied for service his letter was accompanied by a check drawn by the previous occupant. The company relying upon these facts denied the service. A part of Justice MacLean's opinion is as follows:

"It goes without saying that judicial enforcement, resting measurably in discretion of a demand, is to be granted only in aid of enterprises countenanced by law, and not for occupations forbidden by the constitution and made criminal by the statute. So largely are the businesses engaged in by members of this community legitimate and reputable that a certain personal credit attaches to the appellation of a business man. Lawfulness, then, easily can be assumed for the business asserted by the plaintiff (that of carrying on a public telephone service). The premises sought to be equipped for telephonic communication have come and are under the constabulary classification of 'suspicious,' because of construction rendering access difficult to the unadmitted, because of being fitted up as a poolroom, and because the police have found there persons engaged in conducting the business—illicit, but still a business, of pool selling. These things happened, were found, and occurred while one Coyle had upon the premises, under a contract with the respondent, a telephone which was confiscated by the police because of its use illicitly. Now the same Coyle's check is attached to the request for telephonic communica-

tion made to the respondent by the relator, who does not seem to live or be known where he says he resides."

In a previous issue of TELEPHONY attention was called to the ruling of the New York courts in which they denied the right of a person running a poolroom the use of a public telephone on the ground that the use in such places is against public policy. In the case here cited the decision goes even further and denies the right to the use of a telephone in a place where there is good ground for suspicion that it is to be used as a poolroom.

Mandamus by James G. Weston v. New York Telephone Company, denied in Supreme Court, New York City, December, 1904.

INJURY CAUSED BY FALLING OVER LOOSE WIRE.

The Texas & Pacific Telephone Company sought to apply the well-known principle that contributory negligence on the part of the one injured relieves the defendant from liability, in a recent case brought against it by one Prince, in the district court of Nolan county, Texas. The plaintiff while walking on a sidewalk on one of the principal streets of Sweetwater, fell over a wire across the sidewalk belonging to the telephone company, which he alleged had been negligently left in its position by the company's employes. The accident happened in the morning and the telephone company sought to leave the question whether Prince had been negligent in not seeing the wire to the jury which tried the case, as a special question. The plaintiff testified that he did not see the wire, although he said he might have seen it had he been looking, but the court ruled that an obstruction of this character across the walk was an obstruction which would not reasonably have been contemplated by a passerby. Prince was not charged with the duty of looking out for such an unusual obstruction as a telephone wire across a sidewalk, and the court said that the issue of contributory negligence on the plaintiff's part was not open for discussion.

This ruling is an important one and is doubtless the law in all jurisdictions. Telephone companies allow wires to be left across sidewalks, as they occasionally do, at their peril, because pedestrians are not supposed to be aware of such unusual obstructions and if injured by them a case for damages generally arises. Too much care cannot be taken to avoid opportunities for lawsuits of this character.

The telephone company in endeavoring to set aside the judgment against it raised the further question that the town of Sweetwater was responsible for the presence on the streets of obstructions such as resulted in the injury complained of by plaintiff, making it the duty of the town and not of the telephone company to keep the streets and sidewalks clear of obstructions. The company had been engaged in repairing and enlarging its system and left the wire across a public street. This in itself, in the opinion of the court, was negligence and contrary to a duty which it owed the public, and the town was not responsible for results coming out of the telephone company's negligent act.

Texas & Pacific Telephone Co. v. *Prince, 82 S. W., 327.*

FARMERS MERGE PRIVATE LINES.

Seven Independent telephone systems, covering the larger part of the Palouse wheat district, in eastern Washington, have been merged by their farmer owners into one company, to be governed by a board of seven farmers, one to be elected from each line. A central exchange will be established in each town through which the lines run. Stockholders will be given free connections, and all the lines will be charged a small fee in order to maintain the central exchanges.

The present lines are the outgrowth of private lines started three years ago by attaching electrical apparatus and batteries to the scores of miles of barbed-wire fences inclosing the wheat fields. When the subscribers became numerous enough, pole lines were substituted. At present every farmer in the wheat belt who has a telephone can call up any town, or a farmhouse, within a radius of 100 miles.

These Independent rural lines extend from near Spokane as far south as Lewiston, Idaho, and their owners have thus far resisted all attempts on the part of the Bell company to buy them out, and now that they have consolidated into one system they are better prepared than ever before to fight the opposition and to control a majority of the business in the wide territory served by the new company.

MERGER EFFECTED IN OKLAHOMA.

The Consolidated Telephone Company of El Reno, Oklahoma, has sold out to the Topeka & El Reno Telephone Company, the stockholders of the Consolidated company receiving in exchange equal individual holdings in the stock of the Topeka & El Reno. The Consolidated was organized two years ago by Major E. J. Simpson, Otto A. Shuttee, E. E. Blake, and other residents of El Reno. It has exchanges at Hobart, Clinton, Weatherford and Arapahoe, and 350 miles of long-distance lines. A conservative estimate of its property value is $55,000, and it has from the start paid annual dividends of 20 per cent.

The Topeka & El Reno Company is another El Reno institution that has sprung from a very small start to a concern of vast proportions. Six years ago a few residents of El Reno built a telephone line from the depot to their new town of Mountain View, a distance of a mile and a half. Soon they extended the line to neighboring towns. Later prominent men of other Oklahoma and Indian Territory towns, and the officials of the Rock Island railway, became interested in the project, and to-day they have thousands of miles of wire and exchanges in many towns in two states and two territories. The Topeka & El Reno is classed as one of the strongest companies in the west, its property being easily worth $200,000. It has always been a big money maker and it is growing at an amazing rate.

HIGHEST DEVELOPMENT OF THE TELEPHONE.

Members of the Franklin Institute of Philadelphia, the oldest scientific body in America, recently witnessed a successful test of a telephone which makes records of messages, so that they can be transmitted again after the sender has gone away. As explained by the inventor of this new appliance, the machine can do these things: First, it receives dictations; second, reproduces to the dictator; third, reproduces to one at a distant point, the machine being under control at that point; fourth, it records conversations between two persons over the commercial telephone lines without in any way interfering with the operation of those lines, and fifth, it records automatically, in the absence of the subscriber from the office, messages coming over the line in such absence, the machine being under the absolute automatic control from the ordinary performing function of the telephone line, the ringing of the bell starting the machine, the machine sending a signal over the line to the party talking, notifying him that the machine is running, the machine running a fixed length of time, sending another signal, then automatically stopping. It can be used by a typewriter taking dictation. This application of the telegraphone dispenses with the services of a stenographer, and also leaves the principal free to dictate his letters at such intervals as may be most convenient to himself. It also provides absolute privacy to him, a fact not to be ignored, for a communication may be of such nature that the presence of another person is sufficient to divert the mind.

In the Financial Field

THE statement of earnings of the subsidiary companies of the Federal Telephone Company, including eight companies for October, and the United States Company for September, shows an increase of 14.9 per cent in gross and an increase of 21 per cent in net combined earnings, as compared to the corresponding months of 1903. The statement of the Cuyahoga company is particularly good, showing an increase of 21.4 per cent in gross and an increase of 26.4 per cent in net. The United States Company for September showed an increase of 7.5 per cent in gross, but there also was a substantial increase in operating expenses, owing to the fact that unusually large charges were made at that season of the year for maintenance of way and equipment, and the increase was nearly all wiped out in the net showing. The detailed statement shows as follows for all the companies:

	1904.	1903.
Gross earnings	$94.789.64	$82,189.71
Net earnings	35,846.80	29,630.18
Gross increase	14.9 per cent	
Net increase	21.0 per cent	

The Union Telephone Company of California, Pennsylvania, recently issued checks for its fourth quarterly dividend for 1904. The dividend was for 2½ per cent, making 10 per cent paid to stockholders for the year. The four dividends paid during the year have all been paid out of net earnings, no portion of the proceeds of the sale of capital stock having been passed into dividend account. The company's authorized capital at the start was $10,000, which was increased by vote of the stockholders in April last to $15,000, and again increased on December 1, 1904, to $20,000.

The directors of the Interurban Telephone Company decided at a special meeting, held recently at Madison, Wisconsin to bond the company for $25,000, in accordance with a recommendation by the stockholders of the company. The object of bonding the company is to build more exchanges and otherwise improve the system. It was reported by Secretary Hoppmann that in eight months the receipts of the company were over $12,000, which, it is expected, will be greatly increased when the proposed construction and extensions are completed.

The following appeared in a recent issue of the St. Louis *Post-Dispatch*: "The listing committee of the local Stock Exchange has admitted to the trading $2,000,000 of the 5 per cent bonds of the Kansas City Home Telephone Company, dated January 2, 1903, and due Jan. 2, 1923. These bonds are considered an excellent addition to the local trading list as this company is in excellent financial condition at the present time."

The Badger State Telephone and Telegraph Company has filed a mortgage for $500,000 on its property to the Wisconsin Fidelity Trust and Safe Deposit Company. The mortgage is given in consideration of 1,000 bonds in the amount of $500 each, which will be issued by the company in the future. The rate of interest is to be 5 per cent. The company contemplates extensive improvements and extensions.

The Red River Valley Telephone Company recently declared a dividend of 12 per cent and transferred a nice surplus to the reserve fund. The company has a paid up capital of $65,000. The company has 1,050 telephones in use among farmers and business men in Grand Forks, Traill, Steele and Nelson counties, North Dakota, and Polk county, Minnesota.

Stock of the New Long-Distance Telephone Company of Indianapolis is becoming prominent in investors' eyes on account of its cheapness and its rate of interest. The stock pays 4 per cent, is purchasable around 50, and makes shares almost on an 8 per cent basis. The authorized issue of this stock is $1,000,000. Four hundred shares were recently sold at 51½.

The state treasury of Minnesota has received $11,584.50 from the Twin City Telephone Company, as the 3 per cent gross earnings tax on the company's earnings in Minnesota. The gross earnings of the Twin City company, as reported by its officers, for the year ending November 30, were $386,150.

The interest of Dr. A. W. McArthur in the Chillicothe (Mo.) Telephone Company has been purchased by W. H. Elliott, president of the People's Savings Bank of that city, on a basis of $28,000 for the plant, or $14,000 for his half interest. Col. W. B. Leach owns the remaining half interest.

At the recent annual meeting of the stockholders of the Belmont Telephone Company of Bridgeport, Ohio, a dividend of 33 1-3 per cent was declared and the capital stock of the company increased from $75,000 to $100,000. Aside from this remarkable dividend the company is constantly increasing its system and extending its lines.

The Wabash (Ind.) Home Telephone Company has increased its capital stock from $20,000 to $50,000 and put in a $10,000 switchboard. The company has about $70,000 invested in its plant, its stock and bonds are all owned in Wabash, and it is paying in addition to the interest on its $25,000 bond issue, 6 per cent on its stock.

The New Ottawa Telephone Company of Elmore, Iowa, recently issued its annual statement showing its gross receipts for 1904, up to November 1 as $23,973.67, a gain of more than $3,000 over the same period for 1903. It also distributed $8,680 among the stockholders, the dividend rate for the year being 7 per cent.

A. K. Gray, manager of the Star Telephone Company of Farmington, Minnesota, has filed his statement of the gross earnings of the company for the year ending November 30, 1904, which were $3,547.69. While this report covers business throughout the year, practically all was done since July 1.

At the regular monthly meeting of the Citizens' Telephone Company of Grand Rapids, Michigan, the thirtieth consecutive quarterly dividend of 2 per cent was declared, payable January 20. The directors approved the purchase of the Marion, Michigan, exchange.

For eleven months of 1904 the Keystone Telephone Company of Philadelphia earned net $320,130, against $203,197 for the same period of 1903. The company is earning about 7 per cent on the cost of building the plant, which was nearly or quite $5,000,000.

The ordinance granting a franchise to the Bluff City Telephone Company of Hannibal, Missouri, has been so amended that the company will be required to pay but 2½ per cent of its gross receipts instead of 5 per cent.

The Nicollett County (Minn.) Telephone and Telegraph

Company has filed two amendments to its articles of incorporation, one increasing its limit of indebtedness from $2,000 to $5,000 and the other increasing the capital stock from $50,000 to $100,000.

The Union Telephone Company of Alma, Michigan, has paid its eleventh semi-annual dividend. During the five and a half years since first organized this company has never failed to pay a 4 per cent semi-annual dividend.

At the annual meeting of the Calhoun County Telephone Company, recently held at Jerseyville, Illinois, a dividend of 9 per cent was declared on preferred stock and 6 per cent on common stock.

The board of directors of the Twin City Telephone Company of Minneapolis has declared a semi-annual dividend of 5 per cent per annum on the common stock of the company.

Six per cent in cash on the capital stock and 14 per cent in the form of a stock dividend was declared recently by the Galva (Iowa) Telephone Company on the business of the year.

The Maquoketa (Iowa) Telephone Company has declared a 10 per cent dividend on its preferred stock and a 4 per cent dividend on its common stock for the last half of 1904.

The Mutual Telephone Company of Shenandoah, Iowa, recently distributed about $3,000 among its stockholders, being the regular semi-annual dividend of 5 per cent.

William L. Moellering of Fort Wayne, Indiana, recently purchased 1,469 shares of Northern Indiana and Southern Michigan Telephone Company's stock.

The stockholders of the Republic City (Iowa) Telephone Company have voted for a loan not exceeding $2,000 to be used in building new lines.

The United Telephone Company of Bluffton, Indiana, recently paid the annual $10,000 installment on the bonds issued several years ago.

The Interborough Telegraph & Telephone Company of New York city has been incorporated in Albany with a capital of $100,000.

The Daleville (Ind.) Telephone Company recently declared a dividend of 4 per cent on all stock issued by said company.

The Central Telephone Company of Broken Bow, Nebraska, has increased its capital stock from $35,000 to $100,000.

The Grangers' Mutual Telephone Company of Fisher, Illinois, has increased its capital stock from $15,000 to $20,000.

The Shelby (Iowa) Independent Telephone Company, at its recent annual meeting, declared a dividend of 8 per cent.

The directors of the Marquette County (Mich.) Telephone Company recently declared a dividend of 10 per cent.

The Western Telephone Company of Big Springs, Texas, has increased its capital stock from $15,000 to $30,000.

The Farmers' Telephone Company of Hopedale, Illinois, has increased its capital stock from $5,000 to $20,000.

The Gratiot & Brownsville (Ohio) Telephone Company has increased its capital stock from $5,000 to $10,000.

The People's Telephone Company of Chesterhill, Ohio, has increased its capital stock from $5,000 to $10,000.

The Baldwin County Telephone Company of Fairhope, Alabama, has increased its capital stock to $18,000.

The Interstate Telephone Company of Modale, Iowa, has increased its capital to $50,000, and will greatly enlarge its business and construct many new lines.

The Citizens' Telephone Company of Morristown, Tennessee, has increased its capital stock to $18,000

The People's Telephone Company of Bartlett, Ohio, has increased its capital stock from $5,000 to $15,000.

The Oxford (Ohio) Telephone Company recently declared its first quarterly dividend of 1½ per cent.

The rural telephone lines in Franklin county, Iowa, paid a tax on their valuation for last year of $1,039.

The Christian County (Mo.) Telephone Company will increase its capital stock from $6,000 to $15,000.

The Unionville (Ind.) Telephone Company has increased its capital stock from $1,300 to $13,000.

The Cedarville (Ill.) Telephone Company has increased its capital stock from $15,000 to $40,000.

The Newcastle (Ohio) Telephone Company has increased its capital stock from $3,000 to $5,000.

The Emmet County (Iowa) Telephone Company has increased its capital stock to $50,000.

The Macy (Ill.) Telephone Company has increased its capital stock from $3,000 to $10,000.

The Marne & Elkhorn (Iowa) Telephone Company has increased its capital stock to $15,000.

The Lafayette (Ind.) Telephone Company has declared a quarterly dividend of 1½ per cent.

The Kingsley (Iowa) Telephone Company has increased its capital stock to $15,000.

The Slater (Iowa) Telephone Company has just declared a dividend of 8 per cent.

The Stewart (Ga.) Telephone Company has declared a dividend of 20 per cent.

TELEPHONE POPULAR AS FIRE ALARM.

"It will not be a great many years," said the fire chief in a western city recently, "until all fire alarms will be sent in over the telephone, and alarm boxes will be done away with. During the past year at least seventy-five per cent, and possibly more, of the fire alarms have come over the telephone lines. This per cent has been increasing for the past several years, and promises to continue until the alarm boxes will not be used at all.

"We prefer that people should use the telephone instead of the boxes, for the reason that very often it happens that someone will retain his sense sufficiently to tell us the nature of the fire, and in the case of a small blaze we do not have to send the whole department. On the other hand, if the call had come in through the alarm boxes, from anywhere near the center of the city, all three of the stations would have sent out their entire equipment, although it might be that the fire was merely a burning shed, or even a big bonfire, that could have been put out with a bucket of water.

"When a man or woman discovers a fire, he or she is a mighty funny animal. I don't know of anything in the world that will excite the average person quite so much as a fire alarm, and of course the first thing they do is to call the department. Sometimes a level-headed person will tell us that it is nothing of importance and merely ask for the chemical and hose wagon, but in the majority of cases, you would think the whole town was burning down. I will not say the women are any worse about this than the men. In many cases they are calmer under the excitement, and will even talk rationally over the telephone. Some men do, too, but of course they are exceptions."

Organization of a "Central" Office. II

A. DALLAM O'BRIEN.

THE chief operator constitutes the connecting link between the manager and the office force and plays a part which is second to none in the organization. As in the great majority of central offices the operators are women, it naturally follows that the chief operator is also a woman, and thus no great inaccuracy is committed by referring to the chief operator as "she."

The position requires a woman who possesses at once firmness, executive ability, tact, and also the rare faculty of being able to control others, without the necessity of resorting to stringent measures. Probably the most important duty which falls to the chief operator is that of acquiring a thorough knowledge of the characteristics, ability and temperament of each individual operator on the force, and in order to successfully fulfill these requirements the chief must maintain a close relationship with the operators, and at the same time possess sufficient dignity and reserve to avoid any undue familiarity. The actual placing of the operators at the switchboard is done by the chief, the division of the force into the various reliefs which constitute the telephonic day of twenty-four hours also falls upon the chief, all of this work being done subject to the approval of the manager.

There are in every central office, sets of records, which, while designated by various titles, usually contain about the same class of information in regard to the operation, and with these records the chief operator is intimately connected. The office diary, or daily record of events, should be written up by the chief herself, as a great deal depends upon the thoroughness and care with which this record is kept. In this book should be entered the names of all operators who for any cause were absent from duty during the day, the cause being noted after the name of each absentee, also a record of the operators who reported for duty late; and in addition to this, all events occurring during the day, which might in any way affect the service rendered by the central office, should be noted in the diary. For example, in this connection, it is of the utmost importance that this book should show a record of any trouble occurring on a calling circuit, to or from the central office, as in many instances complaints, due to delayed calls, may be traced at once to trouble on the calling circuit, and an explanation given promptly to the complaining subscriber. The chief operator also acts as timekeeper and has charge of the preparation of the pay-roll and making up the weekly or monthly time as the case may be. The relations existing between the chief and her subordinates, down to the rank of supervisor, should be on an entirely different plan from those existing between the chief and the operator, as it is most important for the successful operation of a central office that perfect harmony should exist among the executive force.

The ultimate knowledge of the operator's capabilities, which is the prime requisite for a successful chief operator, can only be obtained by means of a great many expedients, and in order that this may be accomplished, the chief should spend a certain time each day in supervising, and, in this way, learn as much as possible and supplement the information thus obtained, by continued tours of inspection around the switchboard, by discussions with the section supervisors, and also by personal contact with the operators in the operators' quarters. Occasional night meetings with the supervisors and assistants, technically known as the "floor force," should be arranged and at these meetings the subordinates should be encouraged to express their opinions concerning the operators under their charge, and also any ideas which they may have tending to the betterment of the service. Through these meetings the chief is enabled to get a good idea of the calibre of her assistants and thus be able to place them intelligently on the floor. In the opinion of the writer, the chief operator is the person to whom all applicants for positions should apply, and the acceptance or rejection of such applications should be very largely determined by the recommendation of the chief. She should most carefully supervise the education of the students and see that they are instructed by a thoroughly capable assistant, and the chief herself should also supplement this instruction.

It is only in rare instances that the work of handling complaints falls upon the chief operator, as it is seldom, indeed, that an irate subscriber with a real or fancied grievance can be pacified by the sound of a woman's voice, and thus very little time is taken up in this work. The clerical force, which is necessary in order to prepare the reports for forwarding to the auditor's department, will, of course, vary with the size of the office and the number of originating calls. The work to be performed by this force consists of sorting the checks made on originating message rate and pay station calls in such way that these checks may be sent to the auditor, together with a report showing the total number of originating calls during the day; and in the case of an office in which is located a toll board, the reports should also show the number of originating calls for each toll point. With flat rate lines it is of course unnecessary for the operators to make any checks on calls which are local to the exchange district, and in consequence where the flat rate lines constitute a large percentage of the total lines in the exchange the work of the clerical force is considerably reduced. At the present time, however, the tendency with most of our large companies is to enter into as few flat rate contracts as possible, and in consequence until the time arrives when a successful toll meter becomes adopted, there will always be a considerable amount of work which must be done in the handling of checks, by the central office force.

The checks made at the switchboard should be collected every hour, and handed over to the clerical force, by whom they are stamped, showing the date and the hours between which the call was made. It is from these checks that the auditing department gets its record of the number of originating calls from each station, and thus it is necessary that they be preserved for a greater or less length of time in order that the company may have evidence upon which to substantiate its statement to the subscriber, in case of a dispute in regard to the number of calls. Particularly is this necessary in the case of calls originating at pay-stations and also calls for toll points. The number of operators that should be assigned to a single supervisor will depend entirely upon the volume of traffic originating at the office, six operators, as a rule, being a maximum, except during the night, when the traffic is extremely light. The supervisors should patrol their sections and be in a position to answer any questions which the operators may ask and to assist any operator who is momentarily rushed beyond her capacity.

Instruments should be located at various points in the operating room so that the supervisors may be able, at any time, to take up a connection and relieve the operator of the necessity of making any explanation to the subscriber or of becoming involved in any argument. It is the duty of the supervisor to watch carefully the load imposed upon each of her operators, and to note the lines which have a high calling rate, so that she may be able to report at once to the

manager when the load upon a position exceeds the operator's capacity and may, at the same time, make an intelligent recommendation in regard to transferring lines in order to lighten the operator's load. It is, of course, not the duty of a supervisor to order transfers, but it is decidedly a supervisor's duty to keep so closely in touch with the originating traffic at her section that she can at once call attention to the necessity of a rearrangement of lines in order to increase the efficiency of the service. The supervisor should also spend a portion of her time in listening on the positions of her operators in order that she may become familiar with their methods and may intelligently correct their faults.

The supervisor who has charge of the incoming trunk operators has a somewhat different duty from that of the supervisors in charge of the subscribers' positions. At the trunk positions it is absolutely essential that a careful watch should be kept on each group of trunks and that a record should be made of all calls which are delayed on account of busy trunks. With this record the manager is enabled to make intelligent recommendations for additional equipment and can show tangible evidence of the necessity of such additions.

The question of maintaining order and quiet among the operators of her section is also a part of the supervisor's duty, but it will generally be found that in a properly conducted central office, where the operators' loads are so arranged as to work each operator close to the limit of her capacity, there is very little time for infraction of the rules and very little necessity for discipline.

(To be continued.)

OPTIMISM OVER THE TELEPHONE.

"It's easy for the critic to understand why the telephone operator is an optimist—she uses the rising inflection. It's an artful trick of the disciplinarian who trains the young woman for her place before the board, to use elocution in her system. Unconsciously the operator assimilates the lessons of the teacher and when she converses with a patron the "beauty lines" of her lips turn up—a sure indication of good nature. In no circumstances is the young woman to draw down the corners of her mouth and use the falling inflection, as it were. That makes the voice of the pessimist.

Great, strong, bluff and hearty men, engrossed with the cares of business, often pause to muse over the "various language," as Bryant called it, that nature uses. But it is no more commanding in its interest than is the variety of tones that come from the sound waves of the telephone diaphragm.

"Number, pl-ee-e-a-s-e," says the operator, and the train of thought instantly switches to the side of optimism. "How sweet the tones of the operator's voice" is the invariable comment. "And, by jinks, the telephone girl always has a charming voice. Why is it?"

"Simple as a primer," said a telephone expert in a city exchange, when asked why there was such a charm in the stereotyped answer of the telephone girl, "What num-ber, pl-ee-a-s-e-?"

"We give the girls a system of elocutionary training before they get a board. It's a part of the discipline, this almost unconsciously absorbed drilling in optimism. The girl is taught from the start that the language of the pessimist is harsh—that it smites on all ears. It is to be avoided. It follows all falling inflections.

"The voice must be kept up when the operator talks to a subscriber, leaving the effect of a continuous query. The latter is the sign also of constant alertness. The telephone girl is every ready to answer. There is little short of a conclusion in an abrupt, falling sentence.

"It is worthy of note that sociologists have noticed the continuous good nature of the telephone girl as expressed by her voice. 'Are there no discontented among the telephone girls?' asked one of these students. 'If they mask their feelings at all times behind the language of optimism, let us find out how the germ may be spread broadcast in our communities.' "

MANY REASONS FOR USING TELEPHONE.

"The person who is not in the telephone business has no idea of the diversified reasons men have for placing telephones in their homes," said the manager of a big telephone exchange recently. "A few years ago few people had telephones in their residences, but now almost every business man has one, besides many persons in the middle walks of life. The other day a young man came into my office and in a bashful manner told me that if it was not too much trouble he would like to have a telephone put into his house. Of course, I told him we would be glad to accommodate him and asked him how soon he wanted it.

" 'Well,' he said, 'I want it right away. You see, we are expecting a new arrival at our house and I have to spend all my spare time there.' If he hadn't told me I would have known by his manner. One man had a telephone put in a few weeks ago because he broke his leg and he wanted to look after his office business from his bed. It is no uncommon thing to have men who have been taken sick have telephones put in their homes. One of the most novel reasons was that given by a young man last summer. He said he had a tennis court in his back yard and he wanted to spend all his leisure moments playing tennis.

"It is a fact that the increase in the business since 1900 has been greater than the total increase for the previous twenty years. Most of this is due to the fact that the telephone, with the business man, has come to be a household necessity. He can remain at his home longer in the morning and at noon, providing he goes home to lunch, because he is accessible from the office."

THE OVERWORKED TELEPHONE.

One of TELEPHONY's contemporaries calls attention to the fact that an American manufacturer of rotary pumps advertises as follows: "Our pumps at work about three miles out in the country are started and stopped from the company's city office, their operation being ascertained by telephone. This goes on for days without any person going near them." There could, of course, be other electrical methods of observing the fact that the motors and pumps were at work, but the audible indication of the telephone is all right.

There seems to be no end of the duties that can be thrown on the telephone, and each latest suggests a new one. For example, in mill towns, it is now found that calling people in the morning by telephone beats the alarm clock and the perambulating watchman all hollow. This idea has recently received an extension in a western city, where a patient, tired of depending on careless nurses, now has them notified by telephone every time the hour comes around for the administration of his dose. It is said the plan works to perfection.

Recently in Kansas a telephone line was strung into the country for some farmers. One old fellow who had been a very energetic farmer in his day was very much interested, and was invited to visit the exchange. The switchboard, which was of about 1,500 lines, particularly took his fancy, and he said he guessed he understood it all right, as he used to be real handy fixing machinery—binders, reapers, mowers, etc.—only he wanted to know what those girls were everlastingly sticking those pins into that board for.

Present State of Wireless Telegraphy

PROF. J. A. FLEMING, University College, London.

(Continued from January.)

A BETTER method is to adjust until the maximum effect is obtained on a not very sensitive receiver at a little distance. A more important practical matter is to ascertain the wave-length of the radiation sent out from any given transmitting aerial. Appliances for this purpose of various kinds have been devised, but it is clear that no reliance can be placed upon any instrument which has to be placed in contact with the aerial itself, as this act will certainly alter the capacity of aerial and therefore affect the wave-length. The general requirements of such an appliance have been well stated by Prof. A. Slaby (*Elektrotechnische Zeitschrift,* Vol. 24, p. 1007, Dec. 10, 1903).

Such an instrument must give the wave-length of the radiation in free space, be portable and easily calibrated and accurate. Prof. Slaby's solution of the problem is to provide a series of solenoids of wire of various lengths, wound on glass tubes, the turns being insulated slightly from each other. These solenoids are capable of being effectively shortened more or less of the turns. A solenoid is held in the hand by one end and the other end presented to the aerial. The solenoid has its effective length then varied until the maximum glow appears at its outer end. This is detected by the fluorescence produced on a barium platinocyanide screen and then it is assumed that the solenoid has had an oscillation set up in it corresponding to its fundamental oscillation and having a wave length therefore equal to four times the length of the solenoid wire. The end of the solenoid must not be brought nearer to the aerial than one or two feet. It appears that very similar arrangements employing an open or straight resonance coil had previously been employed by Dr. G. Seibt (*Elektrotechnische Zeitschrift,* 1901, No. 22) and also by Count Von Arco. (*Elektrotechnische Zeitschrift,* 1903, No. 1, or the *Electrician,* Vol L., p. 777.)

In the use, however, of a straight resonance coil for this purpose, great care is necessary to ascertain that the oscillation set up in the resonance solenoid is the fundamental and not a higher harmonic. In view of these difficulties a closed circuit wave meter has been designed by J. Donitz.[13] He employs an arrangement consisting of a circular coil having a definite inductance in series with a condenser made of series of semi-circular discs, the capacity of which can be varied within limits by the revolution of these discs on an áxis, the arrangement of the condenser plates somewhat resembling that of a Kelvin multi-cellular voltmeter. These plates are immersed in insulating oil. In inductive connection with part of the circuit is another small circuit including a fine wire platinum coil, sealed up in the bulb of an air thermometer. Hence, the production of the maximum current in the inductance coil and condenser is estimated by the reading of the air thermometer becoming a maximum. The instrument is used as follows: If it is desired to measure the frequency, and therefore the wave length of the oscillations in any circuit open or closed, a loop is formed on that circuit, which is placed parallel to, and at some little distance from the circular coil of the wave meter. The oscillations in the first circuit are then permitted to induce others in the wave meter circuit and the capacity of this last is altered by varying the condenser, until the air thermometer gives its maximum reading. When this is the case, it is assumed that the time period of the two oscillations is the same, that of the wave meter being of course known from the known inductance and capacity of the circuit. Various coils are provided with the instrument to give it a suitable range of measuring power. All instruments so far devised for measuring the frequency or wave lengths in oscillating circuits depend essentially upon the same principle, but all of them require to be used in close contiguity to the radiating circuit. No practical instrument has yet been devised which will enable the wave length of the radiation to be determined at a considerable distance from the radiating source in the manner that we can determine the wave length of light rays at any distance from the source of light.

It is well known, however, that wave lengths of 30 to 50 feet which travel well over a free sea surface are easily obstructed by houses, buildings or elevations on the ground and that for cross-country work a longer wave length is essential. The writer has found that a wave of about 400 feet in length passes quite easily through the buildings and houses of a large town and has worked with such wave lengths across London. When we consider the mass of iron and lead pipes contained in ordinary houses and the immense entanglements of telegraph and telephone wires overhead in large cities it is surprising to find that an electric wave of this length passes so easily through these obstacles.

We may at this stage make brief reference to the nature of the effect propagated through space from the radiator. In scientific language this is called an electromagnetic wave. It consists of a periodic and alternating creation of electric and magnetic force in a plane perpendicular to the direction in which the energy is traveling. In the particular case of a Hertz oscillator consisting of a pair of rods in one line, their approximated ends forming a spark gap, the effect produced in outer space, as Hertz showed, consists in throwing off closed loops of electric strain which move outwards from the rod. The mode of production of these electric strain loops can be deducted from a consideration of the oscillation as consisting in the movement of electrons in the rod rapid enough to bring into play the inertia quality of the medium or ether outside. We may in fact consider that the process of generating light consists in such a dispersal of closed loops of electric strain by the vibrating electrons of the atoms.

If, however, we plant in the earth a vertical rod and set up in its electrical oscillations then the space effect around it will consist in casting off or detaching from it semi-loops of electric strain which move away in all directions from the rod. The exact process of production of these has been considered more in detail by the author in other publications.[15] The outward movement of these semi-loops of electric strain having their ends, so to speak, resting on electrons in the ground and the accompanying production of rings of magnetic force, constitutes the physical phenomena in the external space. We may fix our attention either upon the oscillatory movement of the electrons in the aerial wire or radiator or upon the effect which this produces in the outer space, just as we may pay attention to the movement of the air particles in an organ pipe or the changes in pressure and velocity which constitute the air wave sent out into the space outside. In this case of oscillations set up in an earthed

13. See *Elektrotechnische Zeitschrift,* Vol. 24, pp. 920-925, No. 5, 1903. Also *Electrician,* Vol. 52, January 1, 1904, p. 407.

14. See Cantor Lectures (Lecture IV) on "Hertzian Wave Telegraphy," *Journal* Soc. Arts, London. 1903. Also a letter to the London *Times,* April, 1903, by J. A. Fleming.

15. See Cantor Lectures before the Society of Arts on Hertzian Wave Telegraphy, by J. A. Fleming, March 2, 9, 16, and 23, 1903. Also "Hertzian Wave Wireless Telegraphy," by J. A. Fleming, *The Popular Science Monthly,* June-December, 1903.

vertical rod we have not quite the same state of affairs as when we have oscillations set up in a perfectly insulated rod.

According to the view taken by the writer, in the first case we have semi-loops of electric strain sent off into space, which can only move outward if there are accompanying atom-to-atom exchanges of electrons in the earth or sea surface over which the strain loops move. Hence, a good conductivity is necessary for this and at the same time a good earth connection for the rod. The earth, threfore, plays a very important part in this propagation, and the case of electric radiation sent out from a perfectly insulated Hertz radiator has to be differentiated from that of the radiation from a wireless telegraph aerial earthed at the lower end. It is now well known that the "earthing" of the aerial or antennæ at both sending and receiving stations, as first done by Mr. Marconi, is an essential condition for conducting long distance wireless telegraphy. Whilst it is not denied that telegraphy over small distances can be achieved with perfectly insulated arrangements or by the employment of suitable capacity to balance the capacity of this aerial, yet the earthing seems undoubtedly necessary for practical work, and the waves sent out from an earthed vertical aerial have unquestionably a power of overcoming the earth curvature in a manner which is somewhat anomalous.

Lord Rayleigh has remarked that Mr. Marconi's achievement in sending electric waves across the Atlantic still required some scientific explanation. The waves he first employed had a wave length of about 1,000 feet, or say, one-fifth of a mile. The earth being a globe 8,000 miles in diameter, the ratio of the above wave length to this diameter is 1:40,000. Imagine then an ivory ball one inch in diameter placed in a beam of parallel red light. This ball would be illuminated on one-half and dark on the other, and although there would be a very slight diffraction into the geometrical boundary of the shadow, there would certainly be no bending or diffraction of the rays for a distance equal to 45 degrees of a great circle.

In the case of Marconi's transatlantic wireless telegraphy, however, we have electric radiation sent out nearly parallel to the earth at one place and detected at another place distant by 45 degrees of longitude on a great circle. How is it that this bending of the electric radiation takes place? If it is due to a simple diffraction, then it is proportionately to the wave length vastly greater than anything of the kind we find in connection with the ether waves which produce luminous sensations. It may be suggested that we have here one of the facts which indicate that the radiation sent off from an earthed aerial or Marconi radiator is not identical in every way with that sent out from an insulated Hertz oscillator. In the former case the semi-loop of electric strain propagated outwards has its feet or ends guided around the conducting surface over which it moves. The earth takes a very important share in the process, but since it is not possible to sever the earth we cannot ascertain how far the continuity of the earth or sea between the two places is a necessary condition for the unusual degree in which these long electric waves can, as it were, be propagated around the corner. It is clear, however, that more scientific observations are requisite before we can confidently state an opinion as to the part played by the earth in the phenomena.

Space will only permit a very short reference to the interesting observation of Marconi made in a voyage across the Atlantic on board SS. "Philadelphia" in February, 1902, viz.: That in long distance wireless telegraphy, a given transmitting arrangement is effective over a greater distance by night than by day.[16] Practically this means that it is rather more difficult to send Hertzian waves long distances through that portion of the atmosphere facing the sun than that portion turned away from it. The same thing may be expressed by saying that it requires a more powerful wave to traverse the sunlit air. The effect is not detectable under a distance of several hundred miles, but in his transatlantic experiments in 1902, Marconi found that the waves sent out from a particular aerial and transmitter at Poldhu were detectable on the Atlantic at a distance of 2,100 miles by night, but only about 700 by day. Since that day, by modifications of the transmitting plant he has been able to greatly extend the daylight distance.

An interesting scientific question arises as to the causes of this difference. Prof. J. J. Thomson has shown[17] that electric waves passing through space will exert an action upon electrons or negatively electrified corpuscles disseminated through it. These electrons will be urged forward in the direction in which the wave is traveling. The action is proportional to the square of the wave length and is very small for light waves, but may become considerable for long Hertzian waves. Hence, if there are present in sunlit air free electrons due to the ionizing action of the light on the gaseous atoms, then this medium will absorb some of the energy of long Hertzian waves passing through it and the observed effect would be accounted for, at least in a general sense.

Captain H. B. Jackson of the British navy has placed on record much interesting information as to the relative opacity and transparency of the atmosphere to telegraphic Hertzian waves under particular conditions; and the effects of atmospheric electricity upon the accuracy of signaling.[18]

Just as ordinary telegraphy with wires is interfered with by earth currents and magnetic storms, so space-telegraphy conducted with electric waves meets with difficulties under some circumstances due to atmospheric electricity and particular conditions of the gaseous medium through which it takes place. We must, in the next place, consider the receiving arrangements now in use for detecting the waves sent out by the transmitter. At the receiving station, an aerial wire antenna has to be erected. The electric waves cut through this wire and as the direction of their electric force is parallel to it, the moving magnetic force creates an electromotive force in the stationary aerial by cutting through it just as the moving wire of a dynamo has electromotive force generated in it when it cuts across the stationary magnetic field.

This electromotive is, however, alternating and of high frequency. Hence, if the natural electrical time period of the aerial agrees with that of the incident wave, considerable electrical oscillations may be created. Stationary waves will be set up in the aerial and these will be fundamental or harmonic conditioned, however, by the fact that the current in the aerial must zero at the summit and have an antinode or loop at the earthed end. For the detection of these stationary waves in the aerial, devices are employed which the author has ventured to christen *kumascopes* (from *κυμα*, a wave). These kumascopes may be classified according to the physical principle which underlies their operation. Those in use for telegraphic work are, as follows:

(i) Imperfect contact kumascopes, often called coherers or anti-coherers.
(ii) Magnetic kumascopes.
(iii) Thermal kumascopes.
(iv) Electrolytic or chemical kumascopes.

The first class, or imperfect contact kumascopes, depend for their operation on the fact that if two masses of electric conducting material are in very light contact or separated by

16. See *Proc.* Roy. Soc., June 12, 1902, p. 344. "A Note on the Effect of Daylight Upon the Propagation of Electromagnetic Impulses over Long Distances," by G. Marconi.

17. See J. J. Thomson, *Phil. Mag.*, August, 1902, Vol. 4, Ser. 6, p. 253. "On Some of the Consequences of the Emission of Negatively Electrified Corpuscles by Hot Bodies."

18. See Capt. H. B. Jackson, R.N. F.R.S., *Proc.* Roy. Soc., May 15, 1902. "On Some Phenomena Affecting the Transmission of Electric Waves Over the Surface of the Sea and Earth."

a very thin film of dielectric, the conductivity will be changed considerably if a certain difference of potential is made between the conductors. In some cases (the majority) the change is from poor to better conductivity, in other cases it is to worse conductivity. In some cases (the majority) the initial state can only be restored by administering a slight shock or shear and in others the original state is recovered spontaneously. Hence, we have four classes to consider. The first class of these variable conductors have generally been called *coherers*.

A small mass of metallic filings, preferably nickel or iron in loose contact in a tube between two metal plugs, is a typical case. The mass has a very high resistance until a certain potential difference, not far from two volts is made between the plugs and it then passes instantly into a highly conducting condition and is restored again by slight shocks. Such an arrangement can be used as a relay or relay upon a relay in connection with the kind of telegraphy now considered. For if the receiving aerial wire has inserted near its base the primary circuit of a suitable oscillation transformer and if the filings tube has its plugs connected to the secondary, then the impact of an electric wave on the aerial will be followed by the creation of an electromotive force in it which will be applied to create a conductivity-change in the filings tube. By joining also in series with the tube a single voltaic cell and an ordinary telegraphic relay we have the means of creating a telegraphic signal, by recording the change in the conductivity of the kumascope.

The principal kumascope in use at the present time of this type is the Marconi nickel-silver filings tube, which is not self-restoring, but requires tapping. The Branly tripod and steel ball contact kumascopes are also not self-restoring. The Lodge-Muirhead steel disc and Mercury kumascope, the mercury having a film of paraffin oil upon it, is, however, restored to sensibility by the continual rotation of the steel disc. The mercury-carbon or mercury-steel contact kumascope of Tommasina, on the other hand is a self-restoring contact kumascope. For the details of these kumascopes, the reader must be referred to other sources of information.[19]

The contact kumascopes consisting of metallic filings in tubes require a carefully adjusted tapping in order to be able to record a Morse *dash* as well as a *dot* on the telegraphic tape of the inker used in connection with them. This tapping process limits the speed of working to about 15 to 18 words a minute, but it has the advantage that there is a printed record of the message. The second class of kumascope comprises those depending upon the power of electric oscillations to demagnetize iron or to decrease or increase its magnetic hysteresis.

Rutherford discovered in 1896 the power of electric oscillations set up by electric waves in an open circuit to demagnetize a small bundle of iron wire, and Marconi in 1902 invented a most ingenious telegraphic kumascope depending upon the power of electric-oscillations to annul the hysteresis of an iron core of hard iron wires. He adopted a simple method of detecting this variation of magnetic state. The iron wire is made to move forward in a feeble constant magnetic field, parallel to the lines of force. It is embraced by two overlaid coils. Through one of these the oscillations set up in the receiving aerial pass and the other is connected in series with a telephone. Hence, as the wire advances through the field, the portion magnetized is carried forward by hysteresis, but caused to slip back as soon as the electric oscillation takes place around it, and this by changing the flux through the coil in series with the telephone, causes an electromotive force in it and hence a sound in the telephone. The apparatus is more sensitive than the metallic filings tube as a kumascope and was employed by Marconi in his telegraphic experiments across the Atlantic in 1902 and 1903 and in those in which he sent messages across sea and land from Poldhu to Kronstadt and from Poldhu to Spezzia and to Gibraltar. The writer has also devised a solenoidal form of magnetic kumascope which is metrical and is operated with a galvanometer as indicator.[20] More recently, Ewing and Walter have found that electrical oscillations have the power to *increase* the magnetic hysteresis of hard steel wire and have constructed a kumascope in which this fact is utilized.[21]

There are forms of kumascope which essentially depend upon the heating power of electrical oscillations. Fessenden has constructed one form in which an exquisitely fine platinum wire is mounted in a vacuous bulb, like the filament of an incandescent lamp. When this metallic loop is traversed by an electrical oscillation it is heated and its resistance is changed. By joining it in connection with a voltaic cell and telephone it can be so arranged that the sudden change in resistance of the fine wire alters the current flowing through the telephone and thus causes a sound in it.

Fessenden has also employed a fine column of liquid as the resistance to be heated by the oscillations, and this has an advantage over a fine metal wire in respect of greater temperature co-efficient and larger specific resistance. Lastly, there are interesting forms of kumascope which depend on electrolytic action. One of the earliest of these was due to Schafer and another form to Neugschwender. De Forest has employed one in which a continuous electric current flowing through a very small cell containing a mixture of electrolytes and metallic particles is said to produce a chain of metallic particles between the electrodes. The passage through the cell of an electrical oscillation breaks up this chain and varies the electrical resistance of the cell.

It is impossible to describe here a tithe of the forms of kumascope which have been devised, but it is probably correct to say that all the effective Hertzian wave telegraphic words a minute, depending on the skill of the operator, but it forms of contact kumascope, the principal one of which is the nickel-silver filings tube of Marconi, or else by means of some form of magnetic kumascope.

In the first case, the message is printed telegraphically on paper tape and in the second case, it is *heard* in a telephone as a series of ticks and longer sounds equivalent to the dot and dash of the Morse code. The telephonic method has the advantage in speed and can be read up to 30 or 35 words a minute depending on the skill of the operator, but it has the disadvantage that there is no permanent record of the message and everything depends therefore on the operator being able to hear and take down at the same moment.

The telephonic method enables communication to be established at a rate quite equal to that possible by hand sending over land lines and quicker than hand sending over any long submarine line. The author has devised arrangements by which a punched paper tape can be employed to operate the switch or key in the primary circuit of the induction coil or transformer and so obtain the speed and certainty due to mechanical signaling. Such a method has the great advantage of perfect spacing and duration of signals. By the use of this device *dots* can be interpolated at regular intervals so as to render it more difficult to decipher any tapped message, and a long message can be cut up and the different parts sent simultaneously. In perfecting this automatic sending apparatus, the author has devised an arrangement which enables a signaling switch requiring considerable power to operate it, to be moved quickly by an exceedingly small electric current. There is no doubt that for code messages, especially if received and read by a telephone

19. See Cantor Lectures on Hertzian Wave Telegraphy, by H. A Fleming, *Journal* of Society of Arts. 1903.

20. See J. A. Fleming, "A Note on a Form of Magnetic Detector for Electric Waves, Adapted for Quantitative Work," *Proc.* Roy. Soc., London, Vol. 71, p. 398, 1903.

21. See Ewing and Walter, "A New Method of Detecting Electrical Oscillations," *Proc.* Roy. Soc., London, 1904, Vol. 74, p. 120, or *The Electrician*, Vol. 52, p. 783.

method, the automatic sending should be adopted and the message repeated at least twice.

Some attempts have been made to record the wireless messages directly upon a steel wire or tape in the manner of Poulsen's telegraphone and it would be an obvious advantage if the arriving trains of waves could thus be made to record themselves on a traveling magnetized wire, the record being then afterward read off at leisure by the telephone. Coupled with a method of automatic sending, this would give the highest degree of security for precision in the transmission of commercial messages in which so much depends on the accuracy of every letter.

One of the matters which has excited most controversy in connection with this subject of Hertzian wave telegraphy is the degree to which isolation of the communicating stations is possible. If we except certain experimental methods which have not yet stood the test of practice, we may say that the only plan which has yet been found to afford a basis for such isolation is that depending upon the employment of the facts of electrical resonance. If feeble electromotive forces act in a circuit open or closed, which possesses capacity and inductance and therefore a definite natural time period of oscillation, these impulses will set up in the circuit electrical oscillations of considerable amplitude provided that their frequency agrees with that of the natural time period of the circuit. If C is the capacity of the circuit in microfarads and L its inductance in centimeters, then if the frequency of the applied electromotive impulses is equal to $5 \times 10^6 / \sqrt{CL}$ the condition of resonance will be fulfilled. In order that there shall be a certain rigidity about the electrical system the inductance must not be too small. In fact, the larger the inductance, the less liable will the electrical system be to be set in oscillation by a few feeble or discordant impulses. Hence the method which has been found successful within certain limits for rendering a receiving station sensitive only to electric waves of one particular frequency, is to provide a transmitting appliance sending out waves as little damped as possible, i. e., long trains of isochronous oscillations; next, arranging the receiving appliances, aerial and closed associated circuits to be in syntony with the transmitter, and thirdly, bestowing on the receiving circuit as much inductance as possible.

It is difficult without numerous diagrams to describe the details of the various arrangements that have been proposed to fulfill the above conditions. Many of them are explained in the author's Cantor lectures on Hertzian wave telegraphy delivered before the Society of Arts in 1903. Mr. Marconi's own arrangements for syntonic telegraphy have also been described by him before the Society of Arts.[22]

Briefly speaking, his method is to insert in the base of the receiving aerial the primary circuit of an oscillation transformer, the secondary circuit of which forms with certain adjustable condensers a closed syntonic circuit. The receiving circuits inductively connected are in syntony with each other and with those of the transmitter. The kumascope is attached to certain points on this circuit and the arrangements are such that if a metallic filings kumascope is employed it is only affected when the amplitude of the induced electromotive force in the closed circuit has in virtue of resonance reached a certain value.

Mr. Marconi was the first to show that with his syntonic arrangements he could both send and receive simultaneously two independent messages on the same transmitting and receiving aerials.[23] Theoretically there is of course no limit to the possibility of such multiple telegraphy. In practice it is found that the harmonic oscillations cannot be too near each other, and also that no syntonic circuits are entirely impregnable to attack by powerful vagrant waves, or strong waves of nearly the same period.

On the other hand, if the wave lengths differ considerably, remarkable feats may be performed with syntonic arrangements. Mr. Marconi has again and again demonstrated that such waves as are emitted from his power stations are quite without influence on the receiving arrangements designed by him for ordinary marine intercommunication between ships and shore.[24]

Space will not permit us, neither is it the object of this paper, to enter into detailed description of the various arrangements suggested with the object of isolating completely the intercommunication of wireless stations. Mr. Marconi's work has rendered it possible for his company to establish a widespread system of intercommunication between ships, and ships and shore, which is necessarily conducted with the same wave length of frequency. In the next place he has shown that he can operate large power stations intended for long distance work without in any degree interfering with the operation of the valuable ship communication, and in the third place, what may be called short distance power stations for work up to 300 or 400 miles have been established which are not affected by the waves from the larger power stations.

From time to time a good deal has been said as to the facility with which wireless messages can be tapped, but it must be remembered that as regards messages sent with wires, the privacy attaching to them is not due to any difficulty in tapping but to the legal penalties attending the operation. The question of locating the position of a sending station or of directing a beam of radiation in any required direction has been much discussed. In some of his earliest experiments Mr. Marconi used mirrors and was successful in this manner in limiting the direction of radiation when telegraphy was conducted over a distance of about a couple of miles. Patentees have again and again recurred to the idea of using lenses and mirrors for this purpose. The scientific difficulty which presents itself is that the wave lengths which must be used for telegraphic purposes are very long compared with the size of any apparatus which we can practically construct. Wave lengths as short as 30 feet do not travel well through buildings or over irregular or hilly ground and when we come to using wave lengths of several hundred feet in length, then any mirrors or lenses that we can construct are necessarily small compared with this wave length and the attempt to focus or direct a beam of electric radiation of this character is as impossible as it would be to conduct optical experiments if our lenses and mirrors could only be 0.00001 of an inch in diameter.

No really successful experiments have yet been made in limiting the diffusion of radiation in all directions when electric waves are employed of the character required to travel considerable distances over land or sea. Numerous patents have been filed or applied for, asserted to accomplish this desired end, but by far the larger portion of the patents taken out every year in connection with the subject of wireless telegraphy involve merely ideas or anticipations but not results. Nevertheless, it is not an impossible thing that improvements may be devised for determining both the distance and the direction of the sending station and such an invention would be of the greatest possible use in connection with marine wireless telegraphy, provided that the detecting apparatus is such as could be placed on board ship.

It is impossible in a short paper such as the present one to do justice to the numerous inventions that have been made in connection with this subject; it is also a matter of great difficulty to separate the chaff from the wheat in reading the

22. G. Marconi. "Syntonic Wireless Telegraphy," *Journal* of Society of Arts, May, 1901, Vol. 49, p. 505.

23. See a letter to the *Times*, by J. A. Fleming, London, October 4, 1900.

24. See a letter to the *Times*, April 14, 1903, describing experiments performed before the writer; and also an article in the *Times* for November 10, 1903, describing similar demonstrations made before British Admiralty Officials.

innumerable patent specifications which continue to be lodged for various inventions connected with wireless telegraphy. Probably not one per cent of them are of any real value, or mark a distinct advance on what has been done.

If we endeavor to sum up the position generally at the present moment with regard to practical achievement, we find that in the last three years the Marconi system of wireless telegraphy by Hertzian waves and his form of apparatus have established themselves as a standard system of communication between ship and shore, and ship and ship, and that thereby a most valuable addition has been made to our means of communication totally distinct from other previously existing methods of telegraphy. The Marconi Company have already equipped forty-eight vessels of important lines with these appliances. Eight of these are vessels in the Cunard Steamship Company, five in the Norddeutscher Lloyd, three in the Allan Line, three in the Atlantic Transport Company, four in the American Line, six in the Compagnie Transatlantique, nine in the Belgian Mail Packet Service, four in the Red Star Line, five in the Hamburg-American Line and one in the Isle of Man Steam Packet Company.

Important questions have arisen, which it is not the object of this paper to discuss, in connection with a proposed regulation by international legislation of wireless telegraphy for shipping purposes, with the result that a conference for this purpose was called by the German Government and met in Berlin in August in 1903. This conference was of a preliminary character and whilst the majority of the powers represented were in favor of inter-communication between all ships equipped with wireless apparatus, irrespective of the system employed, the governments of Great Britain and Italy placed themselves outside this proposal.

More recently, serious questions have arisen in connection with employment of wireless telegraphy by neutrals in case of war for the communication of information for journalistic purposes. The government of Russia has made a pronouncement upon this matter which has already secured the serious attention of the principal governments of the world which are interested in this matter, and no doubt important decisions may before long be reached. In addition to its employment by the mercantile marine for the purpose for the conveyance of news to ships at sea, the chief navies of the world have adopted it as a most important auxiliary to their present methods of signaling. The governments of Great Britain, the United States, Germany, and above all Italy, have been particularly active in this matter and much valuable information has been accumulated by the scientific officers who are concerned with this particular department.

No communication on the subject of wireless telegraphy could be considered other than imperfect in which reference was not made to the matter which has chiefly occupied Mr. Marconi's mind and energy during the last three years, viz., the accomplishment of transatlantic wireless telegraphy. As the information which the writer has on this subject is confidential, no communication can be made of facts which are not already before the public, but merely for the sake of placing them on record here, a brief mention of the events connected with this great enterprise may be given.

In July, 1900, Mr. Marconi came to the conclusion that his previous achievements warranted him in seriously attacking this problem and after much preliminary scientific consideration of the subject, a locality was selected at Poldhu in Cornwall in the extreme west of England for the first power station for the production of electric waves for transatlantic telegraphic purposes. The first building began to be erected, to the writer's designs and under his superintendence, in October, 1900, and the electrical apparatus in January, 1901, and this was practically completed in August, 1901, at least in such condition Mr. Marconi was able to begin preliminary experiments with it.

An accident to the masts upholding the aerial in September, 1901, a little delayed experiments, but on the 27th of November, 1901, Mr. Marconi left England on the SS. "Sardinian" for St. Johns, Newfoundland, having previously arranged a programme of operations. On Monday, December 9, 1901, he commenced his experiments and on Thursday, December 12, he received "S" signals at St. Johns which were unquestionably sent from the station at Poldhu in Cornwall and public announcement of this great achievement was made in the English newspapers on the morning of December 16, 1901. He returned to England at the end of January, 1902, and left again in February on board the SS. "Philadelphia," and arrived in New York, March 1, 1902, having received signals and messages on board the "Philadelphia" all the way up to 2,000 miles from Poldhu. The remainder of the year was occupied in completing a new station at Cape Breton, Nova Scotia, and when this was completed messages were dispatched across back to Poldhu to their majesties the King of Italy and the King of England, and numerous other illustrious persons.

During the year 1902 another power station had been completed at Cape Cod, Massachusetts, and in January, 1903, a message was sent by wireless telegraphy across the Atlantic from President Roosevelt to King Edward VII. Meanwhile Mr. Marconi had been busy with other investigations to determine the distance at which these signals could be received in other directions. In July, 1902, he went to Kronstadt on board the Italian warship, "Carlo Alberto," and received messages with his magnetic detector dispatched from Poldhu. In the following autumn on the "Carlo Alberto" he went through the Bay of Biscay to Spezzia, via Gibraltar and received messages from Poldhu in the harbor of Spezzia. Subsequently the "Carlo Alberto" was placed at his disposal by the Italian government for experiments across the Atlantic continued up to Cape Breton, Nova Scotia.

In April, 1903, press messages were sent across from Cape Breton to the London *Times*. Since that date, improvements have been in active progress at this station, necessitated by subsequent inventions of Mr. Marconi.

Criticism has not been wanting on this great practical achievement and many of those who are interested in submarine telegraphy have not hesitated to declare that it can never be brought into a condition in which it can compare with cables as a means of communication. He, however, is a bold prophet who will venture to say what fifty years or even less will not bring forth, and submarine wireless telegraphy has had just fifty years start of supermarine wireless telegraphy. Even the delays and difficulties in connection with the transatlantic wireless telegraphy have only repeated those of the early days of transatlantic submarine telegraphy. It will be remembered that the first attempt to lay a cable across the Atlantic was made in August, 1857, and was a failure. In 1858, a cable was laid successfully, which broke down after a life of three months, after about 700 messages had been passed through it. From that date there was an interval of nearly seven years before a new attempt was made to lay the 1865 cable and it was only in 1866, or nine years after the first attempt, that a cable was laid which established uninterrupted transatlantic telegraphic communication.[25] It is not yet nine years since Mr. Marconi filed his first British patent specification and if we look back at what he has achieved in the past eight years, there is no reason to doubt that he, if he lives, or at any rate those who come after him will carry through the great enterprise he has initiated, to commercial, and successful completion. Hundreds of wireless messages have already crossed the Atlantic and in that one single fact we have the guarantee of subsequent achievement.

25. See "Story of the Atlantic Cable," by Charles Bright. Newnes & Co., London, 1903.

No one who was connected, in their early days, with the then new enterprises of incandescent electric lighting or urban telephony, and who can look back at what has been accomplished in twenty years from apparently the most unpromising beginnings, will need assurance that commercial success can always be obtained where there is a substantial scientific achievement at the bottom of it.

A great part of invention, however, is concerned in discovering, first of all, what will not succeed and this is a matter which involves time and an expenditure of money. The inducements, however, to succeed are so great that having regard to what has already been accomplished it is more than probable that the full completion of hopes that have been entertained will not be long deferred.

This paper, however, is not concerned with prophecy, but with accomplished facts and a simple record of the present state of an art.

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The Telephone in Foreign Countries

ACCUMULATORS FOR MICROPHONE IN TELEPHONE SERVICE.

THE favorable experience gained in connection with the use of storage batteries in telegraphic service induced the German telegraph department to utilize the advantages of accumulator operation also in connection with telephonic service, when no appreciable difficulty was encountered in telephone exchanges. As regards, however, the use of accumulators as microphone current sources in subscribers' stations, special experiments proved necessary, accumulators being discharged there rather slowly, with small currents and at great intervals, which conditions gave rise to self-discharges and sulphating of the plates. L. Brückmann records some preliminary experiments made by imitating the conditions of service in a much-used subscribers' station. As no drawbacks were met with at first these experiments were extended in January, 1895, to the practical service, thirty-six subscribers' stations being fitted with storage batteries of the Böse system.

The following conclusions may be drawn from the behavior so far shown by these storage batteries: Though the working of the accumulators as far as their resistance to shocks, oxidation of the terminals, etc., was concerned had proved rather satisfactory, the condition of the plates was found to be frequently worse than the electric conditions would have warranted. There is a risk of sulphated cells being put in operation again, such accumulators being subject to complete destruction. Apart from this, however, the charging of microphone accumulators requires much more time and work than that of accumulator cells in normal operation, every cell having to be treated separately. Moreover, different conditions would obtain for different types of cells, so that different kinds of accumulators cannot be connected in a common charging circuit (in series). On the other hand, the initial advantages of accumulator operation for telephone service have lost much of their importance because of the introduction of improved microphones. No further extension of storage battery operation was therefore made by the telegraph department.

TELEPHONY IN MEXICO.

The work of constructing a telephone line between San Luis Potosi and San Felipe, Mexico, has been completed. The Mexican government has declared forfeited the concession which was held by J. Woessner of Saltillo, for the construction and operation of a system of long-distance telephone lines in northern Mexico. It is stated that Mr. Woessner was unable to comply with the terms of the concession. A part of the system was constructed and is in operation.

The government of the state of Sinaloa has just granted concessions for the construction of telephone lines connecting the most important cities of the state.

The Mexico City *Herald* says: "T. F. Maguire, the new general manager of the Mexican Telephone Company, has been very busy since his arrival in the city, nearly a month ago in laying plans and getting estimates on the cost of material, labor, etc., for the laying of the underground telephone system. Mr. Maguire states that by the first of February the work upon the underground system will be under way. It is expected that the time consumed in the work will be a year, and by that time the people of Mexico City, according to Mr. Maguire, will be enjoying the benefits of a modern telephone system. The present switchboard will be taken out of the central office and an entirely new and modern one will be set up. It will be nearly a year before the new switchboard can be installed in the central office, and when everything is ready for it the change from the old to the new switchboard will be made, according to the statement of Mr. Maguire, in nine seconds. Mr. Maguire thinks the field for a good telephone system in Mexico City is promising, and as he has had twenty-four years' experience in the business he is well equipped for the work before him in this city, which he says is by no means an easy task."

A local and long-distance telephone system is to be constructed to extend throughout the state of Sinaloa. Large modern telephone exchanges are to be installed at Culiacan and Mazatlan. At present the only telephone exchange in the state is a private concern with fifty telephones in Mazatlan.

A telephone line has been constructed between San Luis Potosi and San Felipe.

HULL'S MUNICIPAL TELEPHONE SYSTEM.

United States Consul Walter C. Hamm, stationed at Hull, England, in a recent report made the following reference to the municipal telephone system in that city:

"The construction of a municipal telephone system in Hull has brought about a speedy reduction in rates. At a recent meeting of the corporation telephone committee it was announced that the charge for unlimited service over an exclusive line would be £5 ($24.33) per annum to private houses and £6 6s. ($30.65) to business premises. This reduction has been followed by a large increase in the number of subscribers. The National Telephone Company has been compelled to reduce its rates for unlimited service to private houses from £10 (48.66) to half that amount. To what extent this reduction will affect the company in other towns and cities is a matter of interest. It is stated that in the agreements which the National Telephone Company has with practically all the large towns and cities in England, and by which the corporations of those towns granted the company underground way leaves, it was made a condition that in case it reduced its unlimited service rate in any place below $48.66, a similar reduction must be made, if demanded, in all other towns. If this is the case, then other cities can now demand the same telephone rate that is made in Hull. Thus, the competition in this city may prove beneficial to every city in England."

AN AUSTRALIAN OPINION OF TELEPHONES IN AMERICA.

According to the Sydney *Daily Telegraph*, John Hesketh, who represented the commonwealth at the St. Louis Exhibition, "is astonished to find that although telephone services in America are no cheaper than those in Australia the use made of them is much greater. In Australia from 2 per cent to 3 per cent of the population utilize the telephone, as compared with 12 to 13 per cent in the United States." In a letter to the central postal administration, Mr. Hesketh remarks that the way in which American telephone companies cater for public business is remarkable, adding that "Every few yards one comes to a slot telephone, where for a modest nickel you may talk to any one on the network." It is believed that there is a great future for public slot telephones on the American plan in Australia, and that the postal authorities have decided upon the installation of a

system of electrical alarms between the banks, business places, and police stations.

THE TELEPHONE IN CANADA.

The *Colonist* of Victoria, British Columbia, states that several millions of poles suitable for telephone purposes will be required by the Canadian telephone trust that has been formed. The proposal is to extend the rural telephones on a vast scale throughout the Northwest Territory.

A provincial charter has been granted to the Ontario Independent Telephone Company, limited to Windsor, Ontario, with a capital stock of $100,000.

The city council of Kingston, Ontario, has granted the Kingston Telephone Company a five years' franchise. The company will erect a $30,000 building.

TELEPHONE NOTES FROM ABROAD.

In certain districts of France thieves have for some time past been making off with large sections of the principal telephone cables.

A company has just been formed at Vigevano, Italy, to be known as La Sociétà Telefonica Vigevanese, to establish and work a telephone line between Mortare, Vigevano, Abbrategrasso and Milan.

The Manila Telephone Company has been organized at Manila with a capital stock of $500,000. It is estimated that it will cost $90,000 to install an effective modern system in Manila and large sums will be spent in extensions.

In the larger towns and cities of Cuba telephone systems are in operation, and permits are granted from time to time for the construction of private telephone lines connecting plantations, etc., with railroad stations, stations of the rural guard, nearest city hall, or adjoining plantations.

The police of Edinburg, Scotland, can be called up from street telephone pillars dotted about the city. It has been decided to let responsible citizens have keys to the pillars at an annual charge of half-a-crown a head. Henceforth the responsible citizen who has been out dining, not wisely but too well, can notify the police of his condition, and claim their assistance.

Professor Garcia of Madrid University has invented an instrument which may solve the problem of wireless telephony. He states that he has been very successful in reproducing the sounds of various musical instruments at a distance of over 1,500 yards, but he has not yet been able to make the sounds of the human voice sufficiently distinct to be intelligible. The difficulty lies in finding a sufficiently powerful microphone.

In May, 1904, the Italian government assumed control of the telephone system of Venice, the bad service and high rates of the private management calling forth a strong protest from the subscribers. The annual charge for telephone apparatus has already been reduced from $40 to $32, and the service is greatly improved, connections being made without delay. A plan to connect Venice and Trieste by telephone has been suggested.

They do things differently in France. The society for the protection of telephone subscribers and the amelioration of the telephone system recently held a banquet. Mademoiselle Sylviac, the actress who called a telephone girl a cow, was the heroine of the evening. She is stated to have looked bewitching in a pale blue confection. The Marquis de Montebello, who presided, said that she would go down to posterity as the Joan of Arc of the telephone, who had first raised the standard of revolt against the despotism of the telephone bureaucracy. To that banner men of all varieties of political faith had been driven by divine discontent. He added that in every country save France the telephone is a perfected invention, and held the United States up as a model to pattern after.

THE TELEPHONE IN WAR AND PEACE.

William E. Curtis, who is one of the most prolific, as well as one of the most entertaining writers in the American press, has been investigating the use of the telephone in this country and abroad, both in war and peace, with the result that he has gathered some very interesting facts. Referring to the telephone as an auxiliary to modern military operations, he says:

"Speaking of modern ideas reminds me that the telephone has been remarkably useful as an implement of war in Manchuria. We used it in the Spanish war to a certain extent, and it was a great convenience in camp, but the Japanese have utilized it on the field of battle, and the men of their signal corps have stood again and again under fire with wires and instruments in their hands, ready to rush forward and string them up as the troops advanced in the face of the enemy, or in following the retreat. Foreign military observers say that several battles have been directed by telephone by the Japanese. The Russians may have used them also. The headquarters of Field Marshal Oyama have been connected by wire with the headquarters of every division and many brigades, regiments and batteries, and orders and reports are now given orally over the wires, instead of being sent by aid-de-camps and orderlies. One of the foreign attaches describes a general of a division in the midst of a battle, seated upon his horse with a transmitter in his hand, making a report to headquarters. He was compelled to fill his left ear with mud in order to hear the replies because of the rattle of musketry around him. The Japanese are farther advanced in the use of the telephone than any other nation except Sweden."

Mr. Curtis quotes William M. Capp of Philadelphia as saying: "Returning friends from Europe tell us that the telephone service in the principal countries far exceeds in promptness and general efficiency the same service in the Unitd States; that it is cheaper to the public, and managed in a more acceptable way." That Mr. Curtis doesn't altogether agree with these "returning friends" is shown by his reply:

"No country except Sweden and Japan has such perfect telephone facilities as the United States. It is also true that in several European cities people can hear operas in their own drawing-rooms over telephone wires. That has been a popular fad, but, at the same time, the ordinary daily service with the butcher, the baker, the groceryman, the liveryman and among the houses of friends in England, France, Germany, Italy and other countries, except Sweden, is nowhere nearly as good as in our own country.

"No American will try a third time to send a message over a German telephone. The first time he tries he will work himself up into such a state of exasperation that the lives of the telephone people are not safe; the second time he will drop the transmitter in disgust and despair, and the third time he will walk two miles to deliver the message.

"Indeed, in France, Germany and England there are comparatively few telephones. You seldom find them in private houses, for the service is so exasperating that people will not use them. Another reason is that the telegraph service is both good and cheap, and a post card will go across the city so quickly that telephones are not so necessary as they are here.

"In Sweden everybody has a telephone at his elbow. The charges are very low. In some private houses you will find half a dozen. The lady of the house talks from her chamber to the cook in the kitchen over a telephone instead of through the old-fashioned speaking tube, and wires are strung through business houses and manufactories so that the clerks at counters and mechanics at their machines can communicate with the managers or the foreman without moving from their places."

Telephone Tales Tersely Told

There are nearly 1,000 miles of telephone lines in operation in Cedar county, Iowa.

The Independent Telephone Construction Company has been organized at Fort Dodge, Iowa.

The St. John's (Kan.) Telephone Company has moved its office and is connecting up nine rural lines.

The Zenith Telephone Company of Duluth, Minnesota, will spend $1,000.000 in enlarging its system.

The Bureau County (Ill.) Independent Telephone Company now has 3,200 telephones in use in Bureau county.

During the past year the Youngstown (Ohio) Telephone Company has put in 800 new telephones and now has 3,000 telephones in its Youngstown district.

The Madisonville, Texas, telephone exchange has been purchased by Messrs. A. B. Foster and H. D. Hunter. Extensive improvements are contemplated.

A committee has been appointed to draft the proposed franchise which is sought by J. C. Hubinger for the construction of a third telephone system in Keokuk, Iowa.

Dr. L. A. Wagner of Sherburne, New York, has perfected a device which serves to inform a person whether or not his telephone bell has rung in his absence.

The Cuyahoga Telephone Company has established a fire and police signal system at Lakewood, a suburb of Cleveland. The new system consists of seven stations.

The Valley Telephone Company of Saginaw, Michigan, added 552 telephones in 1904. It shows increased receipts of $12,222.42 over 1903, and dividends of $16,244.49 for 1904.

The Indianapolis Telephone Company reports the most successful year in its history, having added 1,856 new subscribers in Indianapolis and Marion county during the past year.

In the Nebraska Supreme court the Interstate Telephone Company won in a suit against G. W. Clark, who sought to prevent a franchise being granted the company in South Omaha.

The Twin City Telephone Company of St. Paul, Minnesota, has recently issued a new directory, which was necessitated on account of the rapid growth of the company's business.

The Chippewa County (Wis.) Telephone Company will make two new extensions. Work on the extension of the line to Cobban, Cornell, Flambeau and Holcomb is now in progress.

The Funston Long-Distance Telephone Company of St. Joseph, Missouri, has just completed a line connecting St. Joseph and Cameron, which will accommodate about 1,500 subscribers.

The city council of Tuscombia, Alabama, has granted a twenty-five years' franchise to John C. Monteith and associates of Chicago for the construction and operation of a telephone line throughout the city.

There are in North Carolina 83 telephone systems, with 15,632 subscribers and 24,680 miles of wire. There were 36,000,000 talks during the year 1904. The revenues were $356,472 and the expenses $299,118.

Steps are being taken to construct a rural telephone line through the townships of Aurora, Truro, Hooper and Plankinton, South Dakota, the intention being to connect with the local system at Plankinton.

The Cuyahoga Telephone Company has closed a deal for the purchase of the Collinwood, Ohio, telephone plant. The plant will be consolidated with the Cuyahoga company and put in excellent condition.

Judge Kinne of Ann Arbor, Michigan, has dissolved the injunction obtained by the city against the Washtenaw Home Telephone Company of Ypsilanti, and the company can proceed with its work in that city.

The semi-annual statement of the Louisville (Ky.) Home Telephone Company shows that the company now has 16,601 telephones in use inside the city, and nearly 2,000 outside the city limits and in New Albany.

At the annual meeting of the Brighton (Ill.) Mutual Telephone Company the affairs of the company were found to be in a very prosperous condition, and with the surplus on hand some needed improvements will be made.

Frank L. Beam, manager of the Citizens' Telephone Company of Columbus, Ohio, announces that it will probably be the middle of February before the work of installing the automatic switchboard in the new telephone building can be begun. The building is now under roof, but it has only been lately that heat was secured. The work of installing the new switchboard will require at least two months.

Larrabee Brothers' Telephone Company is preparing to install a new up-to-date central energy system in Stafford, Kansas. The company will also build a toll line to Seward, where it will connect with the Larned Telephone Company.

Senator Clarke of Jefferson City, Missouri, has introduced a bill into the Missouri legislature to authorize cities of the first class to fix rates to be charged by telephone companies by an ordinance. The legislature seems favorable to the bill.

The efforts of the Bell telephone interests in northwestern Ohio to consolidate with certain Independents has been practically abandoned. The merger was balked by the refusal of St. Mary's and other towns to go in on the terms specified.

Barber & Brailey have sold out their interest in the Southern Telephone and Telegraph Company at Hot Springs, Arkansas, to Leo M. Flesh and his associates at Piqua, Ohio, who were interested with Barber and Brailey in the system.

The Dodge City (Kan.) Telephone Company is overhauling its entire system and expects to replace nearly all wires with cables. It expects an increase of over 100 subscribers by spring, and will extend its toll lines to Ford City and Bucklin.

The United Telephone Company of Lakeview, Ohio, has reached the grand total of 2,600 telephones on its system, and 311 miles of toll lines. Preparations are being made to install a large number of telephones next spring all over the whole system.

The Union Telephone Company of Owosso, Michigan, has had a very prosperous year. During the past twelve months 1,400 new telephones have been installed. At Alma the company has doubled its subscribers during the past eighteen months.

As a result of a conference between the Citizens' Telephone Company of Sheboygan, Wisconsin, and the Wisconsin Telephone Company, the latter has agreed to turn over its local service in Sheboygan and Sheboygan Falls to the Citizens' company.

The Citizens' Telephone Company of Columbus, Indiana, is planning extensive improvements. The business of the company has grown so much in the past year that another section will be added to the switchboard and additions made to the toll board.

The Independent Telephone Company of Salamanca, New York, has completed the construction and equipment of three copper circuits to Buffalo via Gowanda. Direct service is thus established to all towns in the vicinity now reached by the Inter-Ocean Company.

The long-distance business of the Home Telephone Company at Covina, California, has increased so rapidly during the last three months that its present toll lines are inadequate to handle the business and two additional lines will be installed between Covina and Los Angeles.

The Paterson, Passaic & Suburban Telephone Company of Paterson, New Jersey, will move into new quarters about March 1. A modern switchboard and telephone plant of 5,000 capacity is being installed. An immediate increase in the number of subscribers is insured.

The exchange of the Citizens' Telephone Company at Pekin, Illinois, began business in February, 1902, with 350 subscribers. The business has grown until there are now 986 subscribers, and a large number of new orders for telephones, which are being installed as rapidly as possible.

The Lebanon (Ind.) Telephone Company has been granted a new franchise for a period of twenty years. The company is to give a $5,000 bond to hold the city free and harmless from damage suits resulting from negligence on the part of the company in operating a telephone system.

It having been determined that no franchise for a new and competititve telephone company at Dallas, Texas, will be granted, the promoter sprung a surprise on the city council by asking for a franchise for a long-distance, agreeing to pay one per cent of the gross receipts for the privilege.

The Pioneer Telephone and Telegraph Company announces that it will install a new telephone system in Tulsa, Indian Territory, with switchboard capacity for 2,200 telephones, at an estimated cost of $50,000. Nine new toll lines will be built by the company in Indian Territory in the next six months.

The Methodist church of Glen Falls, New York, will install a telephone system so that the members of the congregation who

are deaf with be able to hear the sermon distinctly. With a megaphone transmitter placed in front of the pulpit the deaf members can, by holding small receivers to their ears, follow the speaker.

The annual report of the Hooper (Neb.) Independent Telephone Company shows that there are 228 instruments in operation, thirty-seven of which have been installed the past year. The net cost of the system is nearly $15,000. A monthly rental of fifty and seventy-five cents is charged, which netted a profit of $597 the last year.

Manager Boyd of the Nome (Alaska) Telephone and Telegraph Company is extending his long-distance system in accordance with plans laid out by the new company and it will soon be possible to transmit and receive telephone messages between Nome and Kougarok, or between Kougarok and any station on the long-distance line.

B. Laughon, general manager of the Virginia-Tennessee Telephone Company of Roanoke, Virginia, announces that his company, which recently purchased the entire plant of the Southern Bell Telephone Company, doing business in Roanoke and Salem, including in all about 900 subscribers, will make extensive improvements in its system.

The Nicollet County (Minn.) Telephone & Telegraph Company has purchased the St. Peter system. This deal makes the Nicollet county company one of the largest Independent concerns in Minnesota, as it will operate exchanges at St. Peter, Kasota, New Sweden, Gibbon, Gaylord and Lafayette, together with 175 miles of country lines.

The telephone service of the executive departments of the government at Washington costs $50,000 a year, not including the capitol and congressional library, the government printing office, the capitol stables and other governmental branches in that part of the city, which probably pay altogether $25,000 more, making a total expenditure annually of not less than $75,000.

The Covina (Cal.) Home Telephone Company, at an outlay of $50,000, has installed a plant covering the entire territory of the Upper San Gabriel Valley, including the towns of Azusa, Glendora, Charter Oak, San Dimas and Puente. The system already has subscribers in excess of 500 and applications on file which will keep the construction gang busy for the next four months.

Business men and other patrons of the Michigan Telephone Company, in Benton Harbor and St. Joseph, Michigan, are in revolt because of the notice given that a rental of $30 per year is to be charged for telephones in business houses. The present rate is $18 per annum. Dissatisfaction is so pronounced that there is strong talk of the organization of an Independent company.

Practical telephony is taught in the night schools at Rochester, New York. The class in telephony has obtained a complete lot of materials for the erection of a telephone switchboard, and its work for the remainder of the session will consist mainly of the putting together of these materials into a working switchboard. Nothing will be done without the most thorough explanation.

Final contracts have been signed for a trunk line of the Union Telephone and Telegraph Company to extend from Abilene, Kansas, south through Marion, Newton, Hutchinson and Wichita, and thence to Oklahoma. This company has at present a direct line into Kansas City and its proposed line will give all Independent companies of southern Kansas and Oklahoma direct connections with the east.

The Peninsular Telephone Company of Tampa, Florida, is reported in a most prosperous condition. The stockholders at a recent meeting determined to make extensions and additions to the properties of the company, it now having a file order for several hundred telephones. It was also decided to construct more toll lines in connection with the company's properties, which comprise eight Independent exchanges.

Axel Thollander, 1409 West Fifty-ninth street, Chicago, claims that he has perfected an invention that transmits light waves by electricity. He asserts that he can reproduce at one end of a telephone wire a scene enacted at the other. His most marvelous claim is that he can reproduce the opera, the sermon, the play, at the homes of all who have telephones, and that they will see the actors as well as hear everything that they say.

The county tax collector at Springfield, Missouri, has decided to use the rural telephone in collecting taxes in many of the small villages of the county. A toll fee of fifteen cents per message is charged and he finds this method cheaper than livery. He calls the party by telephone and advises the amount of his taxes, asks the party to pay "Central" at the village the amount, and then he collects this amount of "Central," instead of driving to each place.

Ed H. Martin, the Webster City, Iowa, telephone magnate, is to give up his business interests to the care of another for a year that he may resume his career on the stage. He has made arrangements for a year's tour of Europe. Mr. Martin will appear as the "American Whistler." He is one of the few men who have appeared in the past as a professional whistler, and while on the stage a number of years ago made a decided hit, it is said. He has practically given up the work for the last eight years, however, having been engaged in Independent telephone building and promoting. He will sail for Europe early in February, and will appear in the Palace theater in London for a thirty days' engagement, after which time he will tour Germany, France, Italy, Bohemia and Austria.

The Maryland Telephone and Telegraph Company has constructed a line from Frederick, Maryland, to the Pennsylvania state line west of Cumberland, a distance of 100 miles, which opens commercial long-distance service for the company between Baltimore, Pittsburg, Buffalo, Rochester, Erie, Detroit, Sandusky, Cleveland, Columbus and other cities as far west as Indianapolis. From the latter point to St. Louis and Kansas City there is an iron circuit which is being replaced with a copper circuit.

Article of incorporation have been filed for the South Dakota Telephone Company, with headquarters at Pierre, and with a capital of $100,000. The company will construct a telephone line from Pierre to the Black Hills, with branch lines to main points in the section of country between the river and the Hills. The preliminary arrangements are already under way. The line is to be a copper metallic circuit, and up-to-date in every way, with eastern connections made at Pierre from Black Hills points.

The Hull Telephone Company of Neodesha, Kansas, has recently completed a long-distance traffic agreement with the Western Independent Telephone Company, which is building a line from Kansas City to Cherryvale. When this line is completed the subscribers to the Hull system will have long-distance connections with Iowa, Indiana, Illinois, Ohio and Missouri. In Kansas City the connection will be made with the Home Telephone Company, which has 22,000 telephones in that city against 15,000 on the Bell system.

Prominent capitalists of Tacoma, Washington, have applied to the city council for a twenty-five year telephone franchise. They agree to begin on the new line within six months and to complete it within two and one-half years. They will endeavor to secure 6,000 subscribers. The new company offers to put its wires underground in the principal parts of the city and to give Tacoma free use of twenty-five telephones, one per cent of the gross earnings for the first five years and two per cent thereafter during the life of the franchise.

The Montgomery County (Ohio) Telephone Company will shortly begin operations in building lines to connect all the post-offices of the county. In addition the lines will furnish service to all farmers who desire it. Parties who are interested in the Dayton Home Telephone Company are also the leading stockholders in the new company. The capital stock is $100,000 and most of it has been sold. J. C. Reber and Manager Miller of the Dayton Home Telephone Company are the active promoters of the country system.

William Busby, the largest coal operator in the Indian Territory, has acquired heavy interests in the South McAlester-Eufaula Telephone Company, and has been elected president with power to select a superintendent. The company owns exchanges at South McAlester, Eufaula and Hartshorne, and half the Tishomingo exchange. It also owns and operates toll lines from South McAlester to Tishomingo, Eufaula, Fort Smith and Wilburton. President Busby announces that the South McAlester system will be entirely rebuilt within the next six months at a cost of $50,000.

That the Paducah, Kentucky, office of the East Tennessee Telephone Company is a favorite place for Cupid is proven by the fact that during the past year twenty-five of the young ladies of the exchange have been led to the altar. The last to marry was a pretty "hello girl" who for five years had held a position with the company as operator. The men about the office are now laying wagers on how many of the young ladies now working in the office will be married within the year. Needless to say, the young ladies are manifesting considerable interest themselves.

Advices from Newcastle, Pennsylvania, say: "There will be a serious reckoning for some young woman, yet unknown, who for some days past has been having a lot of telephone fun with the society women of the town. Detectives have been put on the case, but nothing has been found. The plan of the young woman is to call some society woman to the telephone and tell her the line is being tested, ask her all sorts of foolish questions, make her talk into the receiver from impossible positions, and then with a gurgle say to her: 'You have been very kind; now, won't you please stand on your head and see how well you can talk that way.'"

The Portsmouth, Ohio, *Times* says: "There is talk of a merger of the various Independent telephone interests of southern Ohio into one big organization, and under one head. The indications are that the deal may be carried out in the near future, as some experienced men are at work on the matter. The men who are behind the move own the Independent lines in Adams, Brown, Clermont and other adjoining counties, and also the line at Maysville, Kentucky. If all these and the Portsmouth and Ironton exchanges could be gotten together into one big company, it would mean a great deal for the Independent telephone interests in southern Ohio."

A Model Private Exchange

THE increasing popularity of the private exchange in state institutions is evidenced by the excellent equipment recently installed in Iowa's new insane hospital at Cherokee, by the New State Telephone & Telegraph Company of Odebolt, Iowa. Before going into details concerning the telephone apparatus we will give the reader a general idea of the building and its other necessary equipment, which will be found quite interesting.

The main asylum building was ready for occupancy about two years ago. It is situated one mile west of Cherokee on a farm containing 840 acres of ground. It was built to accommodate 1,000 patients, and at a cost of $1,000,000. The greatest length of the building is 980 feet, while its greatest width is 600 feet, its foundation measuring one and one-fourth miles. It contains twelve acres of floor space, 30,000 square feet of which is tile. Scores of laboratories, bath and toilet rooms are conveniently located throughout the building. In addition to the main building there is upon the grounds one cottage which will accommodate 250 people, also a large conservatory, necessary machinery, dairy, industrial buildings, barns, etc. In the heating, power and lighting plant are found seven 150-horsepower boilers, three 225-horsepower cross compound engines, direct connected with three large 250-volt generators, which supply current for 2,300 lights and twenty electric motors.

NEW INSANE HOSPITAL AT CHEROKEE, IOWA, WHERE PRIVATE EXCHANGE IS INSTALLED.

The thirtieth general assembly of Iowa made the necessary appropriation for the installation of the private telephone exchange. On June 24, 1904, the contract was awarded to the New State Telephone & Telegraph Company of Odebolt, according to plans and specifications drafted by C. H. Smith, the company's secretary. Work was begun July 18, 1904, and the plant was completed and turned over to the state September 12, 1904, twenty days later than was expected, owing to a delay in waiting for a cable which was lost in transit, necessitating a duplicate order from New York by express to be able to complete the plant within the required time. The entire construction of the system was under the immediate supervision of C. H. Smith of Odebolt and P. C. Cockerill of Jefferson, Iowa, both officials of the New State company.

The system is full metallic, central energy, and strictly modern in every respect. It was manufactured by the Stromberg-Carlson Telephone Manufacturing Company, of Rochester, New York. The switchboard capacity and wiring throughout the building is for the complete installation of sixty telephones. The switchboard is of the desk type cabinet, constructed of quarter-sawed golden oak. The cabinet is equipped with complete operator's set, transmitter on long adjustable arm, operator's receiver with head band and six-foot cord connected to the board with a detachable plug, five-bar switchboard hand-generator, circuit switch to throw from power to hand-generator, six pairs of connecting cords, plugs, weights, and long spring German silver platinum contact listening and ringing keys, provided with double lamp supervisory signals mounted directly in front of, and corresponding in position to, the plugs with which they are associated, and so arranged as to operate the light when a connected subscriber hangs up his receiver, each subscriber having control of the lamp and cord with which he is connected. This cabinet is also provided with one pilot lamp socket and bullseye.

There are installed, for immediate use, thirty visual signals mounted in such a manner that the visuals will not be visible in normal position, but shall appear when a subscriber calls, and be automatically restored when the operator answers. There is also installed a night bell circuit. The board is located in one of the main offices of the institution on the first floor of the administration building.

The lightning arrester and cross connecting equipment consists of two No. 1, twenty-five pair combined cross connecting carbon and fuse lightning arrester boards. The storage battery equipment consists of two sets of ten cells each, having a capacity in each set of twenty-four ampere hours and twenty volts at the normal rate of discharge. The batteries are placed in a cupboard especially built for them.

The power and distributing boards are located in a room in the basement directly under the switchboard room. The batteries are charged direct through lamp resistance from direct current mains, the current being 110 volts. The power board is furnished with one bracket lamp, one Weston voltmeter scale, 1 to 3, and 0 to 35, one underload circuit breaker, and one set of Edison base lamps, with wall sockets for the charging rheostat. There are mounted on the power board throughout all the necessary switches for the operation of the battery plant. All the switches are

properly supplied with designation plates to facilitate the operation of the power plant. All the power board wiring was done with extra heavy rubber-covered braided wire of such size as to preclude any possibility of cross-talk in talking circuits.

The voltmeter is so arranged that a reading may be taken of each battery separate or of each set of ten.

To provide against any charging or mechanical injuries which might accidentally show in the future, the cables leading from the switchboard to the cross connecting board, and all power wires leading from the switchboard to the power board and from the power board to the battery cupboard are enclosed in flexible duct, every precaution being taken to protect all wiring from future injuries. The central office equipment and the entire equipment throughout was installed in an expeditious and workmanlike manner.

Aside from the extensive telephone system operated by the New State Telephone & Telegraph Company in western Iowa, through its construction department, and in addition to the construction of its own exchanges and toll lines, this company makes a specialty of constructing exchanges, toll lines, etc., for other companies. Some of its recent construction is as follows: Rebuilding of the exchange at Moville, Iowa, for the Arlington Telephone Company; construction of the exchange at Whiting, Iowa, for the New Monona Telephone Company; construction of the exchanges at Mapleton, Anthon, Smithland and Hornick, for the Maple Valley Telephone and Telegraph Company; rebuilding of the exchange at Cherokee, Iowa, for the Cherokee County Telephone Company, and the original construction of the plants at Ida Grove and Carroll, Iowa. The company also has several contracts in view for the coming season.

The social energy of any community—the energy that orders and advances—always advances—throbs through the telephone.

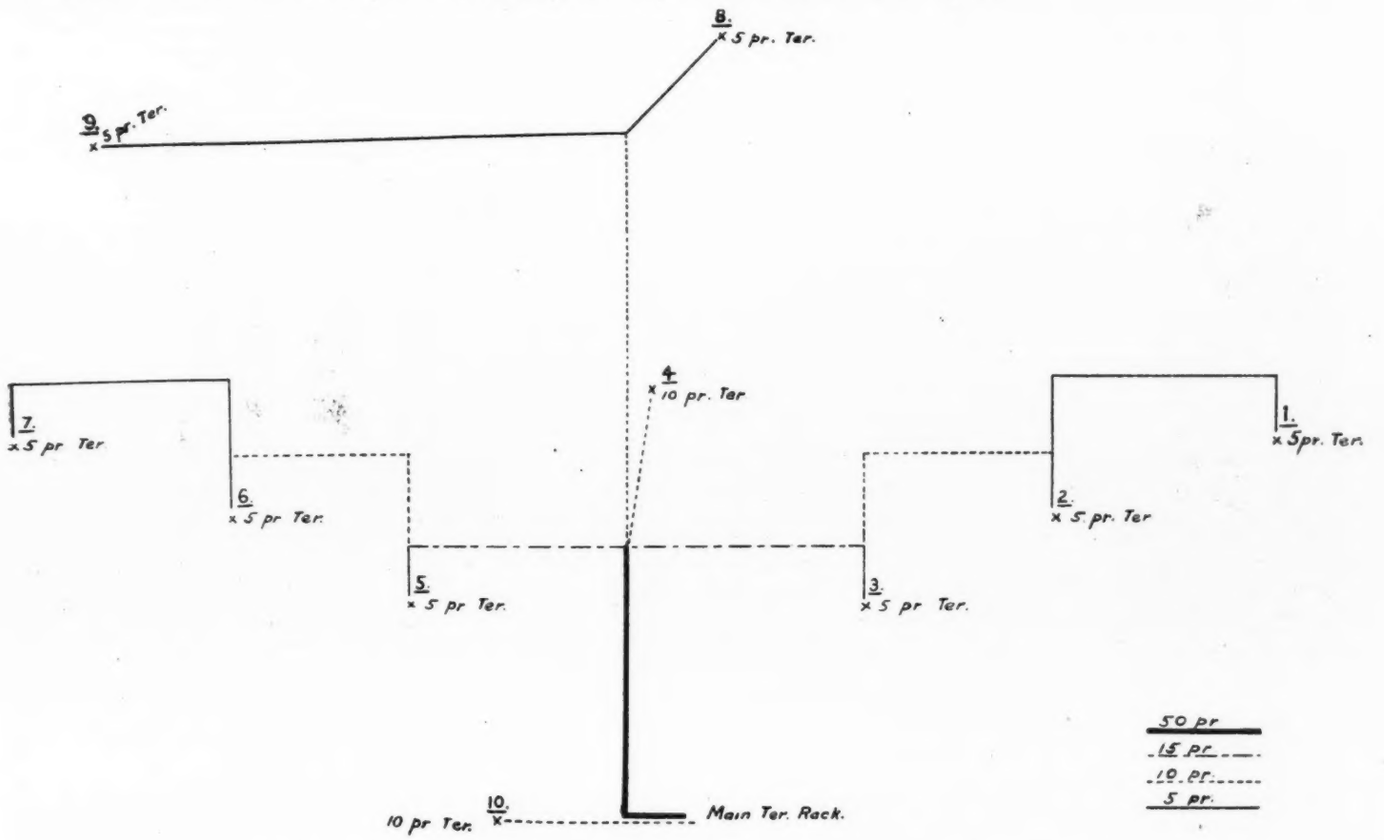


DIAGRAM SHOWING PLAN OF WIRING NEW INSANE HOSPITAL, CHEROKEE, IOWA.

"HELLO GIRLS" AS ALARM CLOCKS.

Four young lady operators for the two telephone companies having offices in Aurora, Illinois, are acting as human alarm clocks for the residents of that city and the neighboring rural districts. An automatic ringer of loud capacity is attached to the telephone in the residence of the party who desires to be awakened. When this ringer is put on, the only way to stop the ringing is for the person to get up and shut it off.

The girls of the Inter-State Telephone Company have a list of about 300 people they call each morning. The hours of calling are all the way from 4 o'clock until 7 o'clock. The list is kept in the office at all times and most of the calls are regular. Then when new subscribers are secured their names are added if requested.

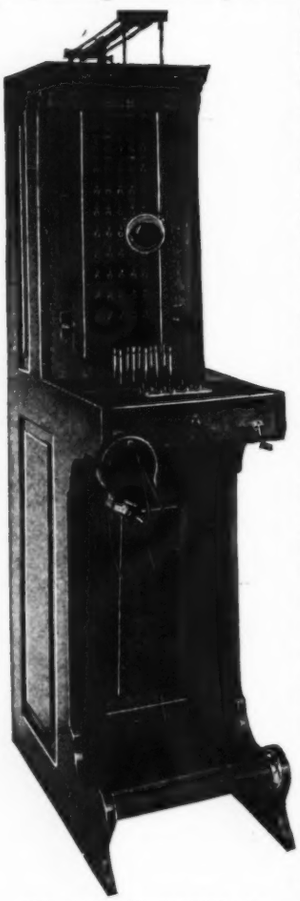
The list is divided into classes, starting with 4 o'clock. All the early risers are headed under the 4 o'clock call, and when they are awakened their names are checked off. There is no oversleeping, as the telephone will ring until some person comes and answers with a pleasant "good morning."

TO BUILD IN NEW YORK CITY.

The newspapers a month or so ago printed an item to the effect that it was rumored Charles M. Schwab was back of a syndicate which would build an Independent telephone plant in New York city. These rumors have been more persistent of late and nearly everybody in the eastern Independent telephone field is repeating them. It is said that there are one or two franchises in New York which could be secured for a small sum and which would allow the building of an Independent telephone plant in the great metropolis. There is no denying the fact that the Independents are very much in need of New York connection.

STANDARD TELEPHONE AND ELECTRIC COMPANY.

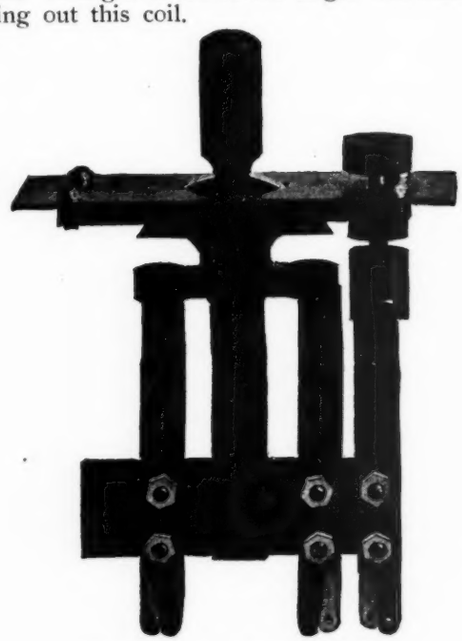
The Standard Telephone and Electric Company of Milwaukee, Wisconsin, is making a strong bid for trade in the Independent field, and its efforts are being crowned with a large measure of success. Under the new management improvements have been going on quietly and accurately on its telephones and switchboards. The Standard's No. 120 switchboard is strictly modern and up-to-date in every respect. On the drops are arranged two open clips, which are slid under a couple of screws in the rear of the switchboard framework. This change allows the switchboard troubleman to remove the drop from the rear of the board entirely, without interfering with the operator or removing the shutter from the face of the board. This feature will be greatly appreciated by all who use switchboards, for interfering with an operator during business hours contributes to poor service. The drop shell can be slid over the coil and the coil may be examined without unsoldering the wire. The winding is insulated from the core by a thin rubber tubing, which the Standard company has been using on its switchboards for some time past.



NO. 120 SWITCHBOARD.

The jack is being made in the same substantial manner, there being no possible chance for any dust to accumulate in contact points. The different springs are insulated with hard rubber, with a rubber bushing the entire length of the screw, which keeps the springs in place.

On the switchboard plugs there has been introduced the loose sleeve action, allowing the operator no chance of twisting the plug over by breaking the cord, which is possible on an ordinary solid sleeve plug. The tip of the plug is insulated throughout by hard rubber from the frame. Very little chance for complaint arises from that feature. The double ringing and listening key, which is used exclusively on the No. 120 switchboard, has platinum contacts, German silver springs, hard rubber insulation and solid die moulded casting frame. The button is used to ring on the answering cord. Pulling the lever to the button results in ringing on the calling cord and throwing the lever away from the button places the operator's set on that cord circuit; an additional space on the frame is secured by adding on a repeating coil circuit, with the button at the top, similar to the opposite side for ringing on the answering cord, with the exception that this button locks by pressing downward, so as to keep the repeating coil in circuit at the operator's will. A slight touch of the finger will raise the button cutting out this coil.



RINGING AND LISTENING KEY.

The Standard company had a very fine exhibit at the Wisconsin Independent telephone convention. Manager Eldred was in charge and gave out about 500 miniature

BANK OF DROPS AND JACKS.

buttons as souvenirs. He is having requests for these buttons from all parts of the United States, and states that the supply will not run out for some time.

WESCO OPENS BRANCH OFFICE IN TEXAS.

The Wesco Supply Company, St. Louis, has established a branch office and warehouse at Fort Worth, Tex., in order to meet the urgent demand of its southwestern trade for a nearer supply depot. This branch will be in charge of V. E.

Raggio, heretofore sales manager for the company and formerly its traveling representative in Texas.

The warehouse is located on the Texas & Pacific tracks at 319-321 West Fifteenth street, directly opposite the Texas & Pacific freight house and in close proximity to the Union Station, which central location will facilitate the prompt shipment of orders.

It is the intention of the Wesco Supply Company to carry in stock at Fort Worth everything in the way of electrical equipment and supplies. The initial consignment comprised several carloads of rubber-covered wire from the largest to the smallest sizes, both double and single braid, and also single and duplex wire. Also a large stock of weather-proof wire in all sizes, iron wire, strand and porcelain material, arc and incandescent lamps, as well as general electric wiring supplies.

It will also carry in stock, ready for immediate shipment, magneto switchboards of the smaller capacities, and magneto telephones, which are the product of its telephone factory in St. Louis. Two carloads of Wesco alternating and Peerless ceiling and desk fans are included in this stock, as well as a full line of motors and dynamos.

EUREKA ELECTRIC COMPANY.

The Eureka Electric Company, Genoa, Illinois, has just put on the market its new improved Carter test set, which has several new features that combine to make it one of the most successful test sets now on the market. The company has not as yet advertised it, yet it reports heavy sales during the past month. This test set is equipped with a combined pulsating and alternating current generator, a buzzer, two keys and a watch case receiver. These keys are so connected that the test set may be used for testing on series, bridging or four-party selective lines. The keys also enable the talking set to be cut in and out of the circuit at pleasure. These features combined make a very dseirable test set and give it a wide range of usage. The Eureka company will be pleased to forward one on thirty days' trial. Any exchange desiring such an article should look into the merits of this set before purchasing.

The Eureka company, during the past few weeks, has made two large foreign shipments, one going to the Philippine Islands and the other to Bombay, India. That is the fourth shipment made by this company to the Philippine Islands within the last year and the second to Bombay within the last three months. It reports a large number of inquiries for its product from foreign countries, and prospects are good that its export business will be increased to a large extent within the next few months. The company has been furnishing for years past telephone equipment complete for the government of San Salvador, and the return orders received denote that the equipment is giving the best of satisfaction.

The Eureka company reports its December and January sales the largest in its history. The new self-restoring type of switchboard which it placed on the market during the past season has been most successful and new orders are being booked daily for deliveries for 1905. The new 7L transmitter and 143 switchhook which it is now installing in its improved type of telephones have been thoroughly tried and tested by a large number of exchanges and the reports are said to be most satisfactory. Samples of this transmitter for test will be forwarded promptly on receipt of a letter from any operating exchange.

Prospective purchasers of switchboards and telephones will be doing well to get the Eureka company's prices before placing orders. The new 1905 catalogue is now ready and the company will be pleased to send same to anyone interested on receipt of application.

A NOVEL ANCHOR TEST.

W. N. Matthews & Brother, 505 Carleton building, St. Louis, the enterprising manufacturers of the Stombaugh Guy Anchors, are making an offer to telephone companies which is, so they say, getting many neaw customers for them. When they find a man who is doubtful of the holding ability of the Stombaugh Guy Anchor they offer to let him screw one of their anchors in alongside of a deadman.

TWO STYLES OF STOMBAUGH GUY ANCHOR.

Take the strain off the deadman and put it on the anchor, in such a manner that if the anchor does not hold, the strain will go back to the deadman and no damage will result. If the anchor does not hold it may be returned by freight at their expense. They expect a convert and payment for the anchor if it does hold. Thirty days is the time allowed for testing. They state that this test almost invariably results in a new customer.

NORTH ELECTRIC COMPANY'S BULLETINS.

The North Electric Company of Cleveland, Ohio, the well-known builders of telephone apparatus, particularly that intended for rural and toll line operation, has just issued two interesting bulletins—Nos. 29 and 30—in regard to newer features of its work. One of these relates to its divided circuit, two and four-party selective magneto telephones. In principle these telephones are similar, the only difference being that the four-party instruments are equipped with biased ringers, whereas the two-party telephones are equipped with ordinary alternating ringers. The four-party can be converted into a two-party by removing the biasing spring, and by the addition of this appliance the two can be made into a four.

The North company, as the result of a long series of tests and investigations, has been able to design a biased ringer which readily permits this change of function and of operation. The circular gives full details as to the method of operating. The other bulletin relates to cut-in stations. In the operation of rural or toll lines it is often found desirable to separate them into two or more sections which can be operated independently, but obviously any such line cannot be left without a ringer or bell conected to the terminus of each section at the point of division. To perform such work, therefore, it is necessary to use, in addition to the telephone at this point, a switch and ringer, usually mounted in one box and constituting a cut-in station.

The North company has worked this out in very neat and

compact form and offer such cut-in stations made up in two forms. In one of these the switching is done by means of a double throw key, and in the other it is accomplished by means of three jacks mounted in the box to be used in connection with a standard switchboard plug and cord. Both types are illustrated in the circular. Among other recent bulletins issued by the North company are those on its permanently adjusted receiver, and on its type "K" magneto telephones. Both of these are very full and explicit in their treatment of the subject and are carefully and freely illustrated. Parties desiring any one or all of these bulletins may receive same by written application to the North company.

THE NEWEST "MAN FROM COOKS."

F. R. Parker's genial smile is becoming very familiar to Iowa exchange managers, and the more he travels the better known becomes the name of Frank B. Cook, whom he represents. Mr. Parker is an old Purdue man, finishing a four-years' course there in June, 1898, with a degree of B. S. in E. E. After graduating from Purdue, he gathered

F. R. PARKER.

some valuable experience by doing all of the cable testing for the Chicago Telephone Company, in Chicago and adjoining towns; and he also did a great deal of drafting and designing for the same company. His last work for the Chicago Telephone Company was the designing of a power switchboard, and the circuits for same, which is now installed in the basement of the main office of the company. Mr. Parker also wrote the specifications for the construction of the board.

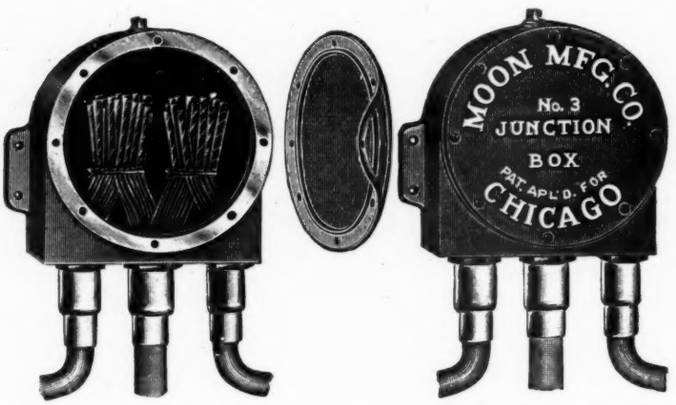
After leaving the Chicago Telephone Company he went on the stage for several seasons, not, however, to demonstrate his histrionic abilities, but to fill the position of electrician. During this period he obtained a good knowledge of stage lighting, and also of many other matters connected with the stage. The Stromberg-Carlson Telephone Manufacturing Company rescued him from an appreciative public and set him to work installing exchanges all over the country. He was with the Stromberg-Carlson company for a little over a year.

Being constantly on the lookout for an opportunity to widen his field, and being of an inventive turn of mind, he spent over a year in perfecting a number of inventions he had made, and acted as his own patent attorney in the prosecution of these inventions before the United States patent office. In October, 1903, Frank B. Cook realized that he needed some assistance in the patent end of his line of work, on his own inventions. Mr. Parker's engagement was the result. From this, the step to traveling salesman was easy, and Mr. Parker is now airing some of his fund of knowledge before the Iowa public, where he is succeeding far better than he expected, but not any better than he deserves.

MOON JUNCTION AND SPLICING BOX.

The Moon Manufacturing Company of Chicago takes the advanced position that telephone cable should be installed in such a manner as to meet certain contingencies which arise, and which make it necessary to reach the cable wires, in order to locate the seat of the trouble; to afford a permanent place of opening at each cable junction, where the wire splices may be inspected and where any error or poor contact may be corrected, thus making every cable wire available. Also that provision should be made at these junctions for alterations, or for connecting additional leads of cable, making allowances for expansion or extensions.

The Moon company claims that the apparatus for this pur-



SPLICING BOX. JUNCTION BOX.

pose should be of a substantial and permanent character and should form a perfect seal against moisture, absolutely free from danger of leaks and breaks in the joints, and which can be relied upon to maintain this condition. With such apparatus the maintenance of perfect insulated cable lines becomes simple and inexpensive.

The accompanying cuts represent apparatus which is designed to meet these requirements, and it is claimed that they fulfill an office of utmost importance, equal to any other feature of the exchange. This apparatus is termed the Moon junction and splicing box, and is briefly described as follows:

It is equipped with self-soldering nozzles, which form a strong, reliable joint with the cable sheath by simply heating the nozzle with a blow torch. It provides a place of opening for the inspection of the cable and of the spliced wires. This opening is sealed completely by the cover and rubber gasket, and forms a perfect joint, similar to the one used in the cylinder head of a steam engine. The cover is held securely in place by heavy machine screws, which do not penetrate to the interior of the box.

Provision is made whereby a small quantity of paraffine or compound may cover the ends of the cable, while the cable wire extends through the compound, and is free for testing or for alterations. A vent at the top of the box provides an opening which is used while the air in the box is being dried out, after the box has been opened for any purpose. After the box has been heated either by a blow torch

or by boiling paraffine, the vent is closed by a screw plug and the box is sealed up like a fruit jar.

Openings in the bottom of the box, closed temporarily by screw plugs of standard tap, may be provided for additional nozzles, and in this manner allowances may be made for cable which is to be installed later.

MODEL FACTORY TELEPHONE SYSTEM.

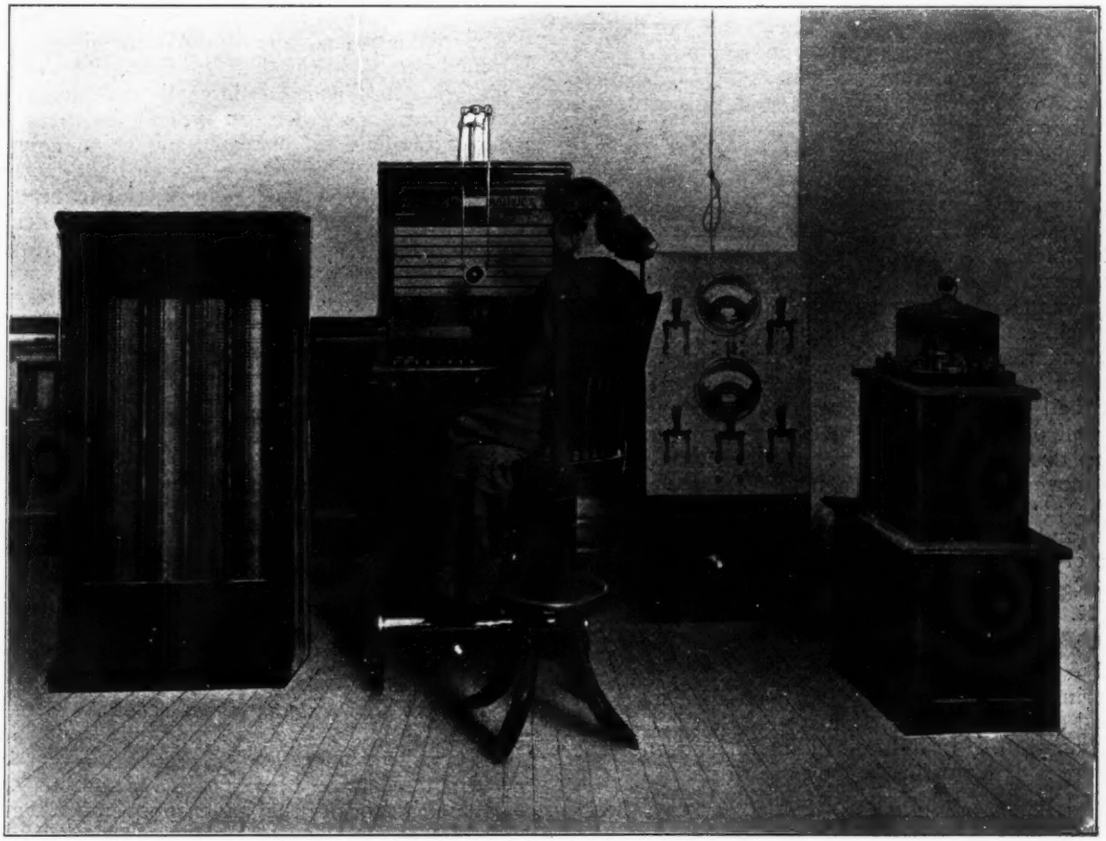
When the Chicago Telephone Supply Company located in its new factory buildings at Elkhart, Indiana, a standard type of inter-communicating system was installed, in connection with all the departments. As the departments began to double and later multiply, the inter-communicating type of system soon became inadequate. The management knew that a great deal of valuable time was being lost. Foremen, sub-foremen, clerks and managers were compelled to take up department matters by personal interviews, which necessitated loss of time in reaching the departments. It was decided that some other system was necessary to properly take care of the daily routine of such a large and complex business, entailing thousands of details which have to be systematically and accurately handled.

After the management had carefully investigated conditions and decided upon the results that must be obtained, they came to the conclusion that a common battery system would be the best and most comprehensive one to adopt. It might appear at first that the almost superabundance of telephones is extravagant, but the system has proved to be a wise economy, as valuable minutes are saved many times each day for every telephone on the system.

One of the main advantages is the fact that executive officers are enabled immediately to communicate with heads of departments, and thus place in actual practice the strenuous motto, "Do It Now." Any executive officer not provided with such instantaneous connection with heads of departments knows how often important matters are delayed or temporarily forgotten in the rush of other affairs.

A special room was selected in the main office of the company and a complete equipment was installed, consisting of one common battery switchboard, code No. 87. This board has a capacity for 140 lines, but has only 100 complete lines installed. The board is furnished with fifteen complete cord equipments of the double lamp supervision type. The line signals are of the well known target visual type. This type of board is designed to give small exchanges the advantage of strictly metropolitan practice. In other words, the apparatus contained in it is of the standard type that is used in the manufacture of large multiple switchboards.

In addition to the regular local lines, there are two special trunk lines connected with supervision lamps and trunk plugs and cords. These trunks are so arranged that the lines may be connected to long-distance equipment, either of the common battery or magneto type, making it possible to talk from any department over the longest lines, and connections are being made daily in the different departments to Chicago and other cities.



PRIVATE EXCHANGE IN FACTORY OF THE CHICAGO TELEPHONE SUPPLY CO., ELKHART, IND.

Mounted in juxtaposition is a handsomely finished oak cabinet, equipped with panel glass front. In this cabinet is mounted the lightning arrester and cross connecting rack. On the opposite side of the board is installed an iron frame, marble panel switchboard, equipped with Weston volt and ammeter, the necessary switches for properly handling the circuits being all carefully wired to bus-bars in the rear.

Back of this cabinet, mounted in a handsomely finished oak cabinet, are the storage batteries, which supply the current for the system. These batteries are the well known American Battery Company's type, and are charged from a circuit leading from the panel board. As the company maintains its own electric light plant, which is of the direct current type, the current necessary to charge these storage batteries is led by a pair of feed wires to the panel board,

the current being reduced to the proper voltage and amperage by the use of 32-candle power lamps, cut in series multiple. The use of a charging machine is thus obviated. While the operator is equipped with the necessary hand generator, a Warner battery generator is used to do the signaling.

Underneath the exchange room, a large manhole has been built, to which are led all of the wires. The wiring has been done in a very substantial, workmanlike manner; it is all cable except from the junction boxes. The lines are then run from the junction boxes to the instruments in standard duplex, which have been installed by the use of insulated staples. Two hundred feet of standard underground work has been installed of lead-covered, paper-insulated cable, from the main office to the main factory building. The balance of the wiring is of the rubber-covered insulated cable type to junction boxes.

Throughout the factory each department and sub-department is equipped with standard Chicago common battery wall sets, numbering altogether about sixty. Where these are in noisy locations, they are placed in sound-proof booths and a loud-ringing extension bell on the outside of the booth conveys the signal.

In the office each desk is equipped with a standard type common battery desk telephone outfit. As these desks number about forty, at first the problem of wiring them seemed to be very complex. It seemed to be necessary to mar the general symmetry of the office by running ceiling drops to the desks. It was finally decided to equip each desk with a special floor jack, equipped with a plug and cord. The jacks are mounted underneath each desk; the plug is fastened to the cord, and in turn the cord leads up to the instrument, allowing the bell and other apparatus to be mounted in some convenient part of the desk. Jacks are provided with miniature trap doors bushed with rubbers, so that when it is desired to move the desk, all that it is necessary to do is to remove the plug from the jack, the miniature door is pushed down and closed over the jack, at the same time making it waterproof for scrubbing, etc.

K. & K. STORAGE BATTERY SYSTEM.

The Kusel & Kusel Company, Monadnock Block, Chicago, is offering to Independent telephone exchanges at a very nominal cost a storage battery system that is claimed to be very economical to install and maintain, and one that does not require a dynamo for the purpose of charging the set. This storage battery system is particularly well adapted for the purpose of furnishing current for the operation of the switchboard operator's transmitters, or for flashlight switchboard trunking.

The K. & K. Company claims to have a most complete arrangement for accomplishing the above mentioned desirable results. In the past it has been customary for exchanges to employ gravity cells or other close-circuit batteries for the furnishing of current for this purpose, the use of which is said to be more or less objectionable. Where a steady and even current is desired storage batteries are far preferable, owing to their very low internal resistance and full current output, in consequence of which their use often solves poor transmitter service at the operator's switchboard transmitters.

The charging apparatus of these storage cells in the past has been one of considerable importance, as it has been necessary to arrange for expensive apparatus, which a great many companies have not felt like investing in for such a purpose. By the K. & K. method, which is very simple and desirable, no expensive apparatus, such as dynamos, etc., for the purpose of charging is necessary.

The K. & K. Company furnishes this storage battery system on all its switchboards regularly, and is also prepared to furnish such outfits to other companies. Full information concerning this very valuable adjunct will be furnished to any exchange or company interested upon application.

The Kusel & Kusel Company is distributing a very handsome souvenir to its first 200 new customers in the shape of a very beautiful and useful souvenir—a desk clock. It is a portable affair and an accurate timepiece.

The company reports an exceptionally large sale of its K. & K. Magnetic "Ring-Thru" coil, which takes the place of an induction coil, as well as a condenser, in a bridging telephone. This coil is meeting with universal favor and is appliable to any telephone.

The company's new catalogue is ready for distribution, likewise other illustrative printed matter of its complete line, which will be forwarded upon request.

BLAKE INSULATED STAPLES.

The Blake Signal and Manufacturing Company of 246 Summer street, Boston, has just added two new sizes, Nos. 5 and 7, to the insulated staples it manufactures, making a total of four sizes which it makes. These sizes cover the demand of the field for insulated staples, namely, low voltage wiring, such as telephone, telegraph, annunciator bell, and in fact all battery circuits. The special features are that the fiber forms a good insulating and mechanical protection, preventing the metal of the staples from coming in contact with and damaging the insulation of the wiring and causing short circuits; the fiber is securely attached so that it cannot come off in driving; flat head, substantial shanks, with sharp points, are used, giving excellent driving qualities.

FOUR SIZES OF BLAKE INSULATED STAPLES.

The cost of the staples is less than the screws alone used in cleat work, and the insulating and mechanical protection is just as good. Wiring can be properly done much more quickly with these insulated staples than with either bare staples or cleats, causing a considerable saving in labor, and a neater, more efficient and better job in every way.

With these staples there are no vexatious short-circuits to be looked for at the expense of much valuable time. These staples already have a large and ever-increasing sale among the Bell and Independent telephone companies, and also for telegraph, fire alarm, annunciator and other low-voltage wiring.

COOK'S NO. 444 SELF-SOLDERING PROTECTOR.

Frank B. Cook, Chicago, reports that he has received the following orders for his No. 444 self-soldering protector: Telluride Power Company, Olmstead, Utah, type "L-3" frame, 50-pair capacity; United Telephone & Telegraph Company, Philadelphia, Pa., type "L" frame, 300 capacity, for Mechanicsburg exchange; York Telephone Company, York, Pa., 200 pairs capacity; Amsterdam Automatic Telephone Company, Amsterdam, N. Y., type "L" frame, 1,200 pairs capacity, with 1,095 pairs equipped; Automatic Electric Company, an addition of 300 pairs to equipment of the Home Telephone Company, San Diego, Cal.; Kinloch Long-Distance Telephone Company, Alton, Ill., "L-3" frame, 50 pairs; United Telephone & Telegraph Company, 100-pair type "L-3" frame, with 50 pairs mounted, for their exchange at Bellewood, Pa.; Kellogg Switchboard & Supply Company, for the Kinloch Long-Distance Telephone

Company's exchange at Granite City, Ill., a 50-pair "L-3" frame, with 50 pairs mounted; Montana & Wyoming Telephone Company, for its exchange at Red Lodge, Mont., a 200-pair type "L" frame, with 160 pairs mounted.

Cook's new No. 8 protector, which is advertised this month for the first time, has created quite a sensation at the telephone conventions at Lincoln, Neb., and Milwaukee, where Cook exhibited his apparatus. The self-soldering heat coils were operated for the benefit of the delegates, and testing instruments were used to show how sensitive the coils were, and how quickly they would operate. Mr. Cook will be glad to send descriptive matter of this new No. 8 protector on application. He claims that it is much simpler than his No. 444, and that it possesses many other advantages over this type. He has already secured many orders for this new protector. The Fairbury Telephone Company, Fairbury, Neb., will equip its new exchange with 500 pairs, and Cook will also supply this type of protector to the Citizens' Telephone Company, of Columbus, Ohio, which ordered 8,000 pairs.

AUTOMATIC GASOLINE SOLDERING IRON AND BLOW TORCH.

Emmelmann Brothers' Manufacturing Company, Indianapolis, Indiana, is successfully introducing on the market a patent Combination Automatic Gasoline Soldering Iron and Blow Torch, illustrated in the accompanying cut, which is one-third the actual size of the tool. In describing the operation of this device, the company states that the cap at *A* is removed and the magazine is filled with gasoline within one-

AUTOMATIC GASOLINE SOLDERING IRON AND BLOW TORCH.

half inch of being full; then the cap is screwed on firmly. The alcohol lamp which accompanies each tool is lighted and the iron heated at *B* for at least three minutes in a slanting position with the head down, keeping the valve *C* closed to generate a hot gas pressure. After heating *B* the stated time the valve *C* is gently opened and lighted by passing the tool over the flame at *F*. The tool should continue to be heated at *B* for three minutes more; the operator can regulate the blast to suit the work to be done by means of valve *C*. If the work is being done outside in a heavy wind, or the tool is used as a blow torch, the shutter at *D* should be closed. The soldering copper, *E*, is universal. Any shape copper point can be used. By removing the copper point shown at *E* the tool can be used as a blow torch. Should the tool not work readily, the steel head shown at *F* can be unscrewed and the small hole in the center of the plug cleaned with a fine wire; the hole, however, should not be enlarged.

The company claims that this is the only successful combination soldering iron and blow torch that requires no pump, no platinum coils or other similar appliances. It will last an unlimited length of time if properly taken care of. It is well constructed, not complicated, easily operated and clean. When properly started, it is claimed that every particle of gasoline is consumed in a hot gas form without any danger of explosion and can be refilled without generating. The cost to keep the tool in constant operation is said to be only about five cents a day.

This tool is being used by electricians, linemen, tinners, plumbers and painters. Among its merits are that it is never too hot nor too cold, while the strongest wind will not blow it out. The tool is furnished with two drop forge coppers, one for regular work and one for heavy work; the head is a high grade steel casting. The cylinder is made of 16-gauge drawn brass tubing, threaded at both ends. The joints are tinned and sweated. The blunt brass valve stem is used, the valve seat being made of material which reduces grinding and binding and leakage to a minimum. In a leaflet issued by the concern several testimonials are printed from satisfied users of this tool.

CEDAR TELEPHONE POLES.

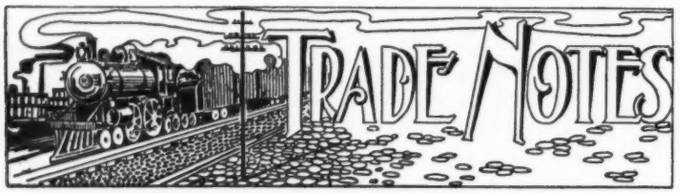
In Monroe, Mich., there is a firm particularly representative of that part of the country, which ranks as one of the leading firms of its class in the United States—the well-known and long-established house of W. C. Sterling & Son. For twenty-five years this firm has been engaged in the cedar pole and cedar tie business, and because of the superior merit of its product, combined with reasonable prices, prompt and proper handling of all orders, and its square and honorable methods of transacting business, the firm has built up a trade which extends to all parts of the world. Having abundant resources and unexcelled facilities it is placed in a position to fill all orders in a manner most advantageous to its patrons.

The white cedar of the north has been clearly proven, so this firm states, to be the best known for poles and ties. Its efficiency, reliability and durability have been thoroughly tested by actual use, and these points demonstrated beyond any point of dispute. In far-off Egypt the telegraph and telephone companies have experimented with every kind of wood known for pole purposes and found none equal for strength and lasting qualities to those furnished by W. C. Sterling & Son from the white cedar of Michigan. As a result this firm received recently a large order from Egypt for a shipment of its white cedar poles. The same tests and results have been made and obtained throughout all parts of North and South America, and the above named firm has filled large orders for its products in all these lands.

Sterling & Son are never without a stock ranging from 75,000 to 100,000 poles, ready to be shipped to fill any contract, and their yards at various points in Michigan are always supplied with a full stock of the most carefully selected quality. This concern is a firm believer in quality, zealously guarding this essential feature in its products, and for that reason it has attained the success which such attention invariably brings.

Wherever Sterling & Son assume a contract for poles or ties, the purchasing parties never worry about the quality that will be received. The reputation of the firm is in itself a sufficient guarantee that the order will be filled with the best product that can be procured, and no customer of theirs can be found, it is claimed, who has ever complained that his order was carelessly filled or that inferior poles or ties were shipped to him. They make a specialty of large contracts, but small orders are just as carefully and conscientiously filled, and if the customer so desires he can send his own inspector to their extensive yards and select his own order, but this is seldom done by any customer of the firm.

The most promising sign of the times in connection with the Independent movement is the constant rise in value of Independent telephone securities and the growing disposition of the investing public to appreciate them at their full value.



THE MACHINISTS' SUPPLY COMPANY, 16 South Canal street, Chicago, invites telephone managers and manufacturers to send for its new catalogue of tools and construction supplies.

THE NATIONAL CARBON COMPANY, Cleveland, is sending out to its customers and friends, with the "compliments of the season," a very beautiful art calendar, which is an ornament to any office or home.

JOHN R. ROEBLING'S SONS COMPANY, with offices in New York city, Chicago, and a half dozen other of the big cities of the country, is distributing to the trade a fine 1905 calendar. A request will bring one by mail.

THE NORTH ELECTRIC COMPANY, Cleveland, Ohio, has opened a branch house at Dallas, Texas. A. A. Miller, who has been connected with the sales department of this company at Cleveland for some time, is in charge.

THE REED ELECTRICAL CORDAGE COMPANY has been incorporated at Syracuse, New York, with a capital of $50,000. The company began operations early in January, and manufactures insulated wire, magnet wire and telephone cord.

W. J. MURDOCK & COMPANY, Chelsea, Massachusetts, manufacturers of the "Solid" telephone receiver, will soon place on the market a new exchange receiver, which they declare will surpass anything they have ever before offered to the trade.

THE NATIONAL CONDUIT AND CABLE COMPANY, New York City, has issued "Copper Gossip" for January, which is a most interesting number and should be in the hands of every telephone manager. Copies will be sent to any address upon request.

THE GUARANTEE TELEPHONE AND EQUIPMENT COMPANY, Chicago, has been incorporated with a capital of $2,500. The incorporators are L. Anderson, Albert Duce and Donald E. Turner. The company will manufacture telephones and electrical supplies.

THE AMERICAN ELECTRIC TELEPHONE CO., Chicago, has contracted to install an 1,800 present capacity telephone system at Paterson, New Jersey. Of this order, 1,000 telephones will be of the well-known Leich selective type, with four-party keys in every cord circuit.

THE WESCO SUPPLY COMPANY, St. Louis, is sending out to the trade an ideally useful souvenir for 1905 in the shape of a desk calendar—a daily reminder of the fact that the Wesco company is strictly on earth and ready to do business with any one wanting electrical supplies.

E. F. KIRKPATRICK, who has charge of the Chicago office of the McRoy Clay Works of Brazil, Indiana, and who is an enthusiast on all matters pertaining to the conduit question, has prepared an attractive blue print on the vital subject of "Duct Feet," bearing more particularly on the multiple method. It shows by means of striking illustrations the proper way of placing duct feet under various conditions. All telephone men interested should write to Mr. Kirkpatrick, whose office is in the Rookery building, Chicago, for a copy of this unique blue print, as it presents the subject along entirely new lines.

THE INDEPENDENT TELEPHONE SYNDICATE, 708 Great Northern building, Chicago, has issued a neat folder relating to Independent telephone enterprises, and particularly relating to their financial features. The folder also itemizes a few of the many good opportunities which the Syndicate has to offer.

THE KEYSTONE ELECTRICAL INSTRUMENT COMPANY, Philadelphia, in Catalogue No. 12 describes and illustrates electrical measuring instruments. Not only are the instruments described in their commercial application, but the theory is carefully detailed, leading to a better understanding of the principles of operation.

THE WILEY-EMERY COMPANY, Seneca, Kansas, is the name of a new firm organized by W. A. Wiley and Judge Emery, for the purpose of manufacturing and selling a machine for raising telephone and telegraph poles and like construction work. The machine is the invention of Mr. Wiley, who has secured a patent on the device.

THE HUMBIRD LUMBER COMPANY, Ltd., Sand Point, Idaho, reports that indications point to a very large demand for cedar poles the coming year, and that the situation from the standpoint of the seller is very satisfactory. The Humbird company has in stock at the present time about 50,000 poles ranging from 25½ feet to 70 feet 10 inches in length.

THE MINNEAPOLIS CEDAR AND LUMBER COMPANY, Lumber Exchange, Minneapolis, has succeeded to the cedar pole business of Carney Brothers' Company, Chicago, and has added the Carney Brothers' customers to its already large list. The company is in position to make prompt shipments of cedar poles from central locations and invites correspondence from prospective buyers.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY, Buffalo, New York, has issued a mailing card setting forth the superior qualities of its Century Platinum Electrode Transmitter No. 5, made for local and common battery work. The company will send to anyone interested a sample switchboard transmitter on sixty days' trial, express prepaid, and invites correspondence.

THE CONTROLLER COMPANY OF AMERICA, Chicago, recently has received a large order from the Martin Telephone Company of Webster City, Iowa, for its educational service controllophones. This company states that it already has a development of 1,000 telephones in and about Webster City, and that there are still 1,200 places where it can place instruments on the new plan.

L. A. MCNEIL, Maywod, Illinois, inventor and sole owner of the McNeil Automatic Transfer for erecting and suspending aerial cable, is sending out some interesting advertising matter pertaining to this unique and highly useful invention. One circular illustrates the transfer and describes its working in detail. Another shows two diagrams of the transfer. They will be sent to interested parties making application.

W. N. MATTHEWS & BROTHER, 505 Carleton Building, St. Louis, state that they are working on a new 32-page catalogue devoted entirely to the Stombaugh Guy Anchor. It is to be the most attractive piece of literature that this enterprising firm has sent out. They expect to have it ready for distribution about March 1, when it will be sent out on

request. It should prove of extreme interest to those who have poles to anchor.

THE NUNGESSER ELECTRIC BATTERY COMPANY, Cleveland, Ohio, and Chicago, is mailing to its customers and the trade in general a neat illustrated catalogue bearing upon the merits of its high grade primary batteries, among which are several styles of dry batteries intended particularly for telephone use. A request will bring one of these catalogues. The company's general sales office is at 128 Jackson boulevard, Chicago.

THE SPIES ELECTRIC COMPANY, 87-89 West Van Buren street, Chicago, is receiving many compliments upon the superior receiver, of which it has been making a strong specialty during the past year. Telephone makers and buyers who appreciate the value of having a good receiver as an adjunct of their instruments' other features will do well to open correspondence with the Spies Electric Company, if they have not already done so.

THE NORTHERN WIRE AND CABLE COMPANY, South Milwaukee, Wisconsin, has recently added thirty-five wire machines to its equipment. This addition was found necessary to provide for the heavy demand which telephone manufacturers and others have been making of late upon its output. The added facilities will enable the company to increase its capacity for all kinds of wire, and to fill all orders promptly. Samples of wire will be sent upon application.

THE VOUGHT-BERGER COMPANY, La Crosse, Wisconsin, has issued a novel advertising folder in the form of a reply postal-card. The desirability of the pendent telephone for all purposes is set forth, and in addition to this there is a detailed description of the apparatus. On the reply half of the card is an order blank with prices of the various types of instruments. The card is to be used in sending for a trial instrument, subject to thirty days' time for demonstration as to its practicability.

THE COMMERCIAL ELECTRICAL SUPPLY COMPANY, St. Louis, is distributing some unique advertising matter in the form of applications to membership in the "Put Away Trouble Club," one of the requirements to membership in which is that the applicant promise to place an order with the Commercial company for Vought-Berger telephones (which it handles) as a "proof of his intention and sincerity." This company also handles Columbia dry cell batteries. It invites correspondence.

THE WILLIAMS-ABBOTT COMPANY, Cleveland, Ohio, will send to anyone upon request, an illustrated circular setting forth the merits of the Williams-Abbott solid-back transmitter for high voltage, central battery circuits and long-distance toll lines. It is claimed for it that it is the most perfect transmitter in the Independent telephone field. This company also handles Sand's electric soldering irons, especially adapted for switchboard work, for 110-volt circuit. An application will bring full particulars and prices.

THE ECCLESTON LUMBER COMPANY, New York city, dealers in southern cedar poles, with mills at Troy, North Carolina, and Mountain City, Tennessee, reports a steadily increasing demand for these poles, and states that last year over 400,000 southern cedar, or juniper, poles were used, which was all it was possible to get out of the swamps, and that at no time did the supply anywhere near equal the demand. The Eccleston company says that it is conceded by all those in a position to know that the years 1905-6 will see a tremendous supply of red cypress poles used, as the supply of cedar, or juniper, is very limited, while there is practically no limit to the amount of cypress that can be used for poles. The company is further of the opinion that there will be an exceedingly heavy demand for poles the coming year, and that prices are bound to advance all along the line.

ELSEWHERE in this issue appears a description of the Moon junction and splicing box, new apparatus designed and manufactured by the Moon Manufacturing Company, Chicago. With this apparatus cable is installed in such a manner that it may be inspected and tested at any time at intermediate points, and any error in splices may be corrected. This firm also manufactures a combination terminal head and junction box, which has become very popular. A very large proportion of its orders are for this type of terminal head.

THE KNOX-DICKEY TELEPHONE MANUFACTURING COMPANY, Portsmouth, Ohio, has recently entered the market with a selective party system which possesses a number of points of interest worthy of the investigation of all exchange managers, one of which is that it operates irrespective of frequency or voltage, thus allowing any type of hand or machine generator to be used. The Knox-Dickey system is admirably adapted for two-party selective service on every class of exchange equipment, whether common-return or metallic-circuit.

THE VOUGHT-BERGER COMPANY, La Crosse, Wisconsin, begs to announce that it has been absolutely deluged by requests for the souvenir celluloid ruler advertised in the last issue of TELEPHONY. It will be very glad, indeed, to send out these rulers to everyone who has sent in the desired information, but regrets that it will be forced to delay the distribution of these rulers until about February 10, owing to the fact that the celluloid factory making them up has been put to an unlooked for delay and will be unable to furnish the rulers until about that time.

THE INTERNATIONAL TELEPHONE MANUFACTURING COMPANY, Chicago, is making its central-energy, as well as its generator-call, wall and desk telephones, so as to completely avoid the use of any of the exposed metal parts as a part of the circuit, absolutely preventing the user from receiving an electric shock when using the telephone. It is said that the International company, in designing its apparatus, considered these points as one of the most essential in the telephone system, especially for large cities or even rural exchanges, where there is considerable danger from lightning.

THE ILLINOIS ELECTRICAL SUPPLY COMPANY, Chicago, "the modern electrical supply house," which also deals in high-grade telephone construction material and specialties, has prepared for distribution its revised net price list and discount sheet, a valuable pamphlet and one that should be in the hands of present and prospective customers. This company also handles the celebrated Washington fir crossarms, and upon application will send to anyone interested an illustrated folder bearing upon the subject and containing numerous testimonials as to the superiority of the Washington variety.

MESSRS. QUEEN & COMPANY, INCORPORATED, Philadelphia, have just issued a new circular, in which they compile the various instruments they make for resistance measurements, from the elaborate and complete Wheatstone bridge and rheostats of the Anthony and Kelvin type, to the small individual unmounted resistance coil, selling at a few cents. It is probably the most complete catalogue which has ever been issued on resistance measuring instruments. It also describes, in detail, Queen & Company's well-known Acme and Decade sets, and considerable space is devoted to the

description of the Queen portable cable testing set. The catalogue is fully illustrated, and persons interested in the apparatus it covers will do well to send for a copy. It is No. 904, and will be sent on request.

THE AUTOMATIC ELECTRICAL COMPANY, Chicago, is distributing a reprint from TELEPHONY of a series of articles by Fritz Lubberger, giving a technical description of the automatic telephone system manufactured under the Strowger patents. This article is one of the most complete that has ever been printed, taking up the history and development of the automatic system. Details are given of the assembly and operation of the various parts, and the illustrations and diagrams are carefully selected so as to render more intelligible the text of the article. This article is a valuable contribution to telephone literature and the reprint will be sent to any one interested upon application.

THE CHICAGO WRITING MACHINE COMPANY, Chicago, reports a decided improvement in trade conditions. The sales of the Adjustaphone and Chicago telephone holder are increasing in a highly satisfactory manner. The recent removal of its factory into new and better quarters, with an entire complement of new Adjustaphone tools and machinery, insures quick deliveries. The company solicits correspondence, and will be pleased to quote prices and send circulars descriptive of the Adjustaphone and telephone holder to anyone upon application. The company announces the removal of its factory from Chicago to Galesburg, Illinois. The improved facilities for taking care of its growing business will enable the company to render better service to its patrons than ever before. The company will retain its general offices at 94-96 Wendell street, Chicago.

THE BAIRD MANUFACTURING COMPANY,, Chicago, manufacturer of telephone pay-stations, Baird time stamps, etc., has just issued Bulletin No. 8 on the subject of pay stations, which says: "Now is the time for you to give thorough consideration to the question of the liberal use of telephone pay-stations both for public and private use. Our three, four and five-slot mechanical pay stations for public use are great dividend makers and our mechanical and "rapid fire" electrically controlled machines for party line service are very profitable to the telephone company and satisfactory to the patron. We are just bringing out some new model rapid service machines, which have all the latest improvements and are without question immensely superior to anything heretofore offered for sale. We are enabled to supply machines for both central energy and magneto telephone service, and will soon be prepared to submit samples for examination and trial. If you have not one of our latest catalogues, please write us for it and we will be pleased to send it by return mail."

"THE RURAL TELEPHONE" is the title of a neat little book of 72 pages issued by the Swedish-American Telephone Company of Chicago, which makes a specialty of rural-line telephones. In the words of the preface, "It is not designed to take the place of the more elaborate treatise on telephony. * * * The man on the farm is the one for which it is especially intended. He is one who cares very little for theories, but prizes very highly anything that gives him a practical knowledge of the workings of a useful art." Technicalities have been avoided, in order that the book may be of the greatest service in giving instruction in the construction of lines, the selection of superior apparatus and the government of mutual companies. The work is copiously illustrated and abounds in everything of interest to builders of rural telephone lines. Its phraseology is breezy, and altogether it is highly entertaining. The book is now in its second edition, which bids fair to be soon exhausted. Anyone desiring a copy should make written application to the Swedish-American Telephone Company.

THE J. W. MORRISON LUMBER COMPANY, Minneapolis, although comparatively young in the business, has shipped over 40,000 poles during the past year, is contemplating a larger business for the coming year, and has anticipated its wants by making contracts for 50,000 poles to be produced at Deer River and Cohasset, Minneapolis. It will commence shipping on the new stock May 1 and will have a complete assortment of poles from 16 1-3 feet to 60 2-3 feet. The company, in looking up its prospects for the coming year, canvassed the territory somewhat west of the Mississippi river, and among other questions asked how many miles of new line the different companies expected to construct this year. So far it has received 109 replies, giving definite number of miles, the aggregate amounting to 7,651 miles, counting forty poles to the mile (306,040) or seventy miles for each company. The amounts reported by the companies varied from five to 1,000 miles. If this is any indication—and it surely is—there is going to be an unprecedented demand for poles this year, and there should be a decided improvement in the price.

THE UTICA FIRE ALARM TELEGRAPH COMPANY, Utica, New York, is out with an elaborate illustrated catalogue descriptive of the telephones and telephone apparatus it manufactures. It is elegantly gotten up and should be in the hands of every telephone man. The company was established in 1876 and says in an introductory note to the trade in the catalogue: "The many years experience in the manufacture of telephone apparatus has placed this company in the front rank of Independent telephone manufacturers. We have at all times aimed to give the public the finest apparatus which it was possible to produce, tried and found true because it has been made right; constructed along the best lines, and made from the best obtainable material; carefully designed to produce the highest possible efficiency; built by experienced workmen and by modern machinery; finished in the highest and best forms known to the art. The success of our company is the result of the combination of an established organized factory, the highest engineering skill, an intimate knowledge of telephone requirements, a good will and long experience second to none."

EARLY "WIRELESS TELEPHONE."

New Yorkers justly pride themselves on the completeness of their telegraph and telephone service in these days. All the same there was a very efficient means of communication between the early Dutch settlers before the year 1700. It might be called the first wireless system used in America, though there was no electricity about it and the poles were common Dutch windmills. The windmill appeared in America almost as soon as the Dutch set foot on Manhattan Island. In a few years there was such a mill on every bit of rising ground in the island. When the windmills were not running their owners used them to signal with. They worked out a regular code of signals, bits of which code tradition has handed down. When the sails were set square, with one arm pointing to the earth and one to the sky, it meant a hostile invasion. The same signal with the upper half of the mill door open heralded a peaceful arrival. And so on through a great variety. The signals could be read a long way off, and by being repeated on each mill a message could be sent throughout the island in a very short time.

The switchboard is the nerve center of the telephone system to-day. Without it the commercial use of the telephone would be impossible.

J. W. Ward has purchased the Sauk Center (Minn.) telephone exchange.

Dr. Gelstrap is building a new telephone line from Wheelock to Eaton, Texas.

F. B. Patton and Percy Jones are now with the American Electric Fuse Company.

A. G. Hawley has purchased an interest in the Argyle (Wis.) Telephone Company.

Doyle Murphy has purchased the telephone exchange at Holland, Texas, of John McWhinney.

D. M. Neill has been granted a telephone franchise by the city council of Red Wing, Minnesota.

George Ward of Yellville, Arkansas, has leased the telephone lines in Marion county, same state.

A. S. Armstrong has applied for a franchise to construct a telephone system at Greenwood, Indiana.

Howard Dykeman has purchased the controlling interest in the Stamford (N. Y.) Telephone Company.

Ed Ziebarth is interested in the promotion of an Independent telephone system at Delano, Minnesota.

Myer A. Loeb of the Rock Island Battery Company, Rock Island, Illinois, was in Chicago on business recently.

Martin H. Driftmier has succeeded J. R. Markley as manager of the rural telephone office in Clarinda, Iowa.

W. F. O'Gara of Hamilton, Ohio, is interested in a telephone line which will be built at Sugar Grove, Ohio.

Walter H. Ames, manager of the Independent Telephone Company at Tremont, Illinois, recently joined the Masons.

J. F. McDermott has gone on the road for the Independent Telephone Manufacturing Company of Madison, Wisconsin.

H. H. Smith and Paul Laborde are interested in a new telephone system which is being organized at Covington, Louisiana.

J. T. Jones has secured a contract to construct another seventeen miles of telephone line near Elk Mountain, Wyoming.

T. A. Perry and M. J. Bruton are interested in the telephone company which is being organized at Churchville, New York.

Dr. J. H. Vogel, on behalf of the Blue Earth City Telephone Company, has applied for a franchise in New Ulm, Minnesota.

Frank Mortimer of the Home Telephone Company of Los Angeles has filed an application for a telephone franchise in Fresno.

George Wilson has been appointed manager of the Greenfield (Ohio) Home Telephone Company to succeed Jack Zeeck, resigned.

J. J. Beatty of Watson, Pennsylvania, is superintending the building of an extension to the Meadville Telephone Company's inlet line.

G. W. Mason of Kanawha, Iowa, has been elected president of the Hancock County Rural Telephone Company to succeed E. C. Abbey.

W. H. Gates of Bartlesville, Indian Territory, manager of the Cherokee Telephone Company, has been granted a franchise at Ramona.

L. J. Pettijohn has purchased the Dodge City, Kansas, telephone exchange, has taken possession, and is making arrangements to have it rebuilt.

C. H. Perry of Tonkawa, Oklahoma, has been appointed to succeed J. O. Thomas as secretary of the Farmers' Mutual Telephone Company.

S. A. Vopatek has made arrangements to build a telephone line from Wesley to Lonsdale, Minnesota, and will commence work in the spring.

Hugh Rogers and N. M. Rogers have purchased all the shares of the telephone system at Lathrop, Missouri, and are now the sole proprietors.

J. S. Turner, manager of the Alice, Wade City and Corpus Christi (Texas) Telephone Company, contemplates the improvement of the system.

A. V. Hunt of Olean, New York, has purchased the Home Telephone Company of Port Allegheny. He will extend the wires to Smithport and Coudersport.

C. D. Morris of Black Rock, Arkansas, manager of the Lawrence County Telephone Company, installed a telephone exchange at Mansfield, Missouri, recently.

Dr. E. L. Thomas and John Weems have sold the Fullerton, Nebraska, telephone exchange to T. M. Sheaff, who formerly owned it. Mr. Sheaff took possession January 1.

John B. Elliott of Hollidaysburg, Pennsylvania, will organize a new telephone company, with lines running through Krankstown, Catherine, Tyrone, Blair and Logan townships.

William H. Bassett, traffic manager of the Kinloch Long-Distance Telephone Company of St. Louis, recently made a trip through Kansas and Indian Territory in the interest of his company.

H. E. Furlong, H. A. Lambert and G. E. Codrington have recently purchased the Cleveland telephone system at Cleveland, Oklahoma, and will at once make improvements and extensions.

Aaron Newby has been appointed superintendent of the Fairmount (Ind.) Telephone Company to succeed John Kelsey, resigned. Mr. Kelsey will still be retained as president of the company.

George W. Brown, general sales agent of the Chicago Telephone Supply Company of Elkhart, Indiana, recently has been working in the territory of Oxford and Burrton, Kansas, with good success.

H. E. Stimpson of Minneapolis has taken the position of local manager for the Consolidated Telephone Company, which has exchanges at Cambridge, Grantsburg, Frederic and Luck, Wisconsin.

C. F. Tonn, who for eight years has been general manager of the Illinois Telephone Company of Jacksonville, Illinois, has resigned. W. W. Holiday, local manager, will temporarily have charge of the system.

Henry E. Biester has returned to his former position with the Standard Telephone and Electric Company, having left the employ of the Independent Telephone Manufacturing Company at Madison, Wisconsin.

W. H. Meyers, manager of the Amboy (Ind.) Telephone Company, states that considerable construction work will be done upon the system, and that an exchange will be established at Converse next spring.

W. B. Serviss, superintendent of construction of the Union Telephone Company of Owosso, Michigan, gave a dinner in that city recently to a party of trouble men and the Owosso foreman—a dozen guests in all.

T. H. Ewing, formerly manager of the automatic telephone exchange at Lincoln, Nebraska, has accepted a position as representative for the American Electric Telephone Company in the states of Iowa and Minnesota.

H. B. Hewitt, western representative of the Stromberg-Carlson Telephone Manufacturing Company, with headquarters at Chillicothe, Missouri, recently was in Winfield, Kansas, looking after his interests in that section.

J. L. Whitaker, formerly of the Western Electric Company, has taken a position as traveling salesman with the Eureka Electric Company of Genoa, Illinois, and will look after the territory tributary to Illinois and Iowa.

F. C. Toepleman, general manager of the Home Telephone and Telegraph Company of Henderson, North Carolina, was the recipient recently of a magnificent leather covered rocking chair from the employes of the entire system.

Roy A. Baird, formerly manager of the Choctaw Telephone Company, Caddo, Indian Territory, has accepted a position as traveling salesman with the Eureka Electric Company of Genoa, Illinois. He will look after the western trade.

Tony Schaffer, general manager of the Ellis County (Texas) Telephone Company, has assumed the management of the Ennis exchange and Eldridge McCandless, former manager, has taken charge of the exchange at Waxahachie.

H. A. Douglas, formerly manager of the telephone exchange at Jackson, Michigan, has returned from an extensive sojourn in Trinity county, California, greatly improved in health. He will be heard from again soon in the sphere of telephone activity.

A. M. Forth, manager of the Douglas County Telephone Company's exchange at Tuscola, Illinois, was married on New Year's day to Miss Mabel Walkins, who was formerly a "hello girl" in the Tuscola "Central" of the Douglas County Company.

J. L. McNeill, wire chief, and Thomas Swann, line foreman, recently resigned their positions with the Home Telephone Company of Richmond, Indiana, the former to take charge of a telephone plant in Ohio, and the latter to become foreman for the A. D. T. Company at Jacksonville, Florida. Before leaving Richmond they were tendered a banquet by the local lodge of the International Brotherhood of Electrical Workers.

R. W. Kemp, consulting and contracting engineer, of Wichita and Wellington, Kansas, has contracts for mutual lines to extend over nearly every county in the western part of the state, besides several large mutual exchanges that are being constructed to take care of the farmer rural lines that are being built in the territory surrounding. He builds the mutual lines and then contracts to keep them in repair for so much per subscriber per year, thus turning over all the lines in a county to one repairman, sending a construction force from another point to do all new work.

Manifold Uses of the Telephone

BY and through the educating influence of the Independent telephone movement, as the direct result of its unparallelel growth and the mighty power it wields in its vast field of operations, all the world is at the telephone, so to speak, and somebody finds a new use for this greatest of modern conveniences nearly every day. The telephone goes to sea on the ocean liner and the warship; it is placed thousands of feet underground in the innermost recesses of mines; it is found upon snowcapped mountain peaks. Telephone wires are buried under crowded city streets and mighty rivers, and stretch to the farm and the forest. The telephone in its ordinary form may be used by anybody, except the man deprived of speech and hearing. At the same time, the telephone may be adapted to the peculiar needs of any group of people or of any industry. So many are the purposes for which the telephone is employed to-day that few in the cities know of the part it is playing on the farm and in the forest, while people who live far from the towns have little idea of the way in which the telephone is used by their city cousins.

The telephone companies, far and wide, while they have been constantly adding to their equipments and extending their lines to accommodate the increase in the ordinary employment of the telephone, at the same time have been adapting it to a multitude of uses which were unknown but a few years ago, and which are still novel to the great majority of telephone users. Telephone experts have designed instruments for use in places where ordinary apparatus cannot be employed; they have studied the methods of men in different occupations, so that unusual demands for service might be met promptly and satisfactorily, and insofar as possible they have looked ahead and arranged to meet the needs of the future.

When telephone systems were wanted in coal mines where water and sulphur unite to destroy the apparatus, the engineers immediately devised means to protect the instruments. When a business house notified some one of the big Independent companies that it desired to talk every day over a line perhaps hundreds of miles long, engineers and managers worked together to make such a service satisfactory. Whether the new use which somebody has discovered for the telephone is to be great or small, telephone men try to make it successful, believing that the soundest business policy is that which tends to give the best service to all classes of patrons.

In many cities telephone companies have been called upon to devise means by which the telephone may always be at the elbows of thousands of users. The modern office has a telephone on every desk; the department store has a telephone at every counter; the factory, in every department. All the telephones in one of these establishments may be connected with each other or with the telephone lines outside the buildings. Each office, store and factory system has its own switchboard and operators. The private branch exchange has been developed during the last six years by the telephone companies and has proved of inestimable value to business men. Through the private branch exchange a man may talk by telephone to another in the same room or to a person in a city many miles away.

The private branch exchange is especially adapted for hotel use. With a telephone in every room and an exchange in the building, the guest, without leaving his room, may talk to anybody in the house, to any telephone user in the city, or, over the long-distance lines, to his home, perhaps hundreds of miles away. Nothing which the Independent companies have done to improve the value and efficiency of their service has proved of greater popularity than this method of equipping a building or a suite of offices with a telephone system of its own, and at the same time connecting it with the local and long-distance lines outside.

In the dwelling house the telephone is fast taking the place of the speaking tube, and instruments are often found not only on every floor, but in many of the rooms. Here apparatus of a special design is employed, so that no switchboard is necessary. By the use of such a system the mistress may speak from the parlor to the cook in the kitchen, to the grocery or dry goods store, to her friends in the same city or in other places.

The adaptability of the telephone to special conditions is shown in many ways. The contractor of to-day who undertakes extensive construction work regards the telephone as an indispensable ally. The telephone companies frequently connect their lines with buildings which exist only on paper. Telephones are placed about the works while the foundations are being laid, and as the skyscraper mounts story by story the wires are lengthened, so that the workmen a hundred feet in the air may communicate with the shed of the foreman, and the architect in his downtown office may talk to the men engaged in the work. The engineer who has planned a tunnel under the waters of a river or through the heart of a mountain is by the telephone kept in touch with the men in the foremost sections of the work. As the tunnel creeps forward foot by foot, the wire is unreeled, and the telephone instrument is always at the elbows of the workmen. The construction crew in the tunnel are separated from the outer work by airlocks and bulkheads; the daylight is shut out by the walls of the prison-like structure and the tons of earth and stone around it, but the workmen are at all times able to hear the voices of those in the world without.

Telephone wires are even connected with instruments on railroad trains whenever a stop of any length is made. Long-distance electric roads are operated by the use of the telephone, and for their purposes apparatus of a special design is used. The telephone instruments are enclosed in water-tight boxes, fastened to poles by the side of the track at the regular meeting places of the cars. Connected with the telephones are electric lamps. Any one of these may be lighted or extinguished by a person in the car dispatcher's office, perhaps many miles away. When a conductor sees a lighted lamp he uses the telephone to communicate with the company's office, and over it receives instructions as to the running of his car.

The steam railways did not at first feel the need of the telephone because they relied upon the telegraph. But now they appreciate the advanatges of a system which enables employers to talk directly with the officials. Telephones are installed in signal and switch towers, and in a large railway station the conductor, standing by his waiting train, is able to talk with the office of the dispatcher.

The telephone is the guardian of the public peace and the protector of the home. Police telephone systems keep the patrolmen on their beats in touch with headquarters. The fugitive criminal has difficulty in getting beyond the reach of the long-distance lines. Many cities have relied upon a telephone system in place of the ordinary fire alarm telegraph.

IN THE RURAL LINE DISTRICTS

Telephone fever is again on the hill.—*Harmony Hill Happenings in Emporia (Kan.) Gazette.*

Jess Read now has the telephone and is ready to "hello" whenever called.—*Grant Grist in Aurora (Neb.) Republican.*

The boys and girls are having quite a time over the telephone these days.—*Fargo Flashes in Falls City (Neb.) Tribune.*

Fighting over the telephone is getting to be quite a fad nowadays.—*Portsmouth Pickings in Harlem (Iowa) American.*

A telephone line east of Rice will be next on the program. Come in one and all.—*Graham Grist in Sauk Center (Minn.) Press.*

A new telephone wire from Oldenburg to Peppertown is a late addition. Hurrah!—*Peppertown Pods in Brookville (Ind.) American.*

A telephone company remembered its patrons with a pincushion full of pins last week.—*Highlandlake Hunches in Longmont (Colo.) Ledger.*

The telephone is an assured fact in Pohocco, and some are having sweet dreams about it.—*Pohocco Pointers in Fremont (Neb.) Tribune.*

Telephoning is the order of the day. They are measuring the ground to find where to set the poles.—*Algansee Items in Coldwater (Mich.) Star.*

The Farmers' telephone line is being "talked up," and a number have expressed their willingness to put in telephones.—*Lester Links in Coldwater (Mich.) Star.*

The telephone line from Glasco has climbed up on to these ridges at last and is being placed in almost every house.—*Graves Glimpses in Concordia (Kan.) Kansan.*

The telephone company held a meeting at the home of W. C. Emmings last Monday night, oysters were served and a jolly time reported.—*Webster Wisps in Dallas City (Ill.) Enterprise.*

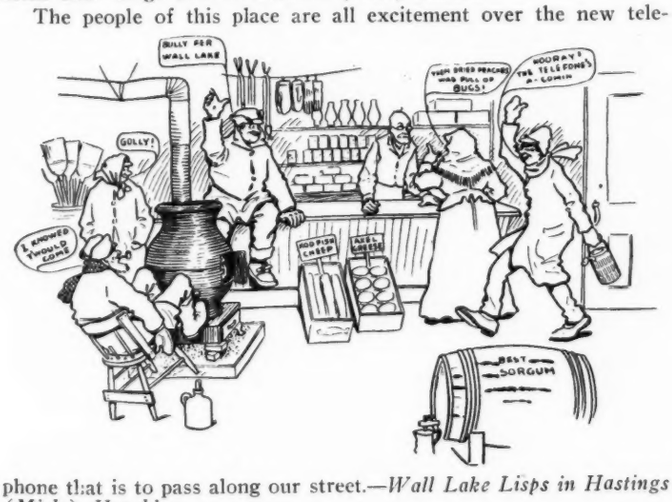
A new telephone line is being built to Grabill from the northwest called the Klopfenstein corner. It will be completed very soon, then look out for news.—*Leo Lights in Berne (Ind.) Witness.*

There was quite an excitement over the union ten and the Bradford telephone lines being connected Christmas eve. We think it was a Christmas joke.—*Clifton Correspondence in Lancaster (Mo.) Republican.*

It was a noble deed in the management of the Clinton Telephone Company to give the patient girls of the exchanges a Christmas holiday, but how lonely it did seem all day. We hope to appreciate more and more the great satisfaction and convenience of which we are favored by the telephone.—*College Contributions in Wilmington (Ohio) Journal.*

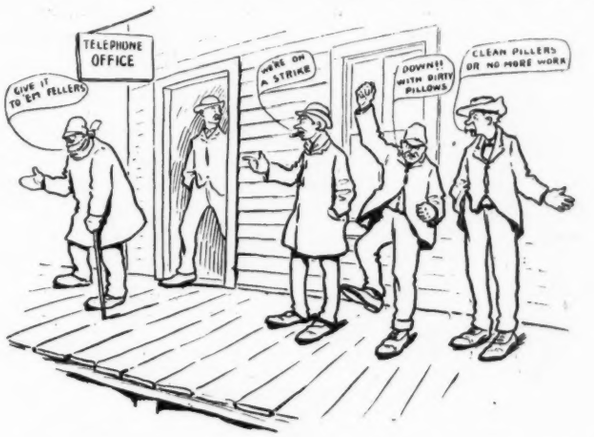
Connections are being made quite rapidly with the telephone line. At present four or five families can talk together. But we understand that a couple of the young men in this neighborhood were trying to talk ahead of time—before connections were made. Really those Wilson boys must have been quite anxious to talk to some one.—*Bega Bits in Stanton (Neb.) Picket.*

The people of this place are all excitement over the new tele-



phone that is to pass along our street.—*Wall Lake Lisps in Hastings (Mich.) Herald.*

Another great strike is on. Fifteen of the linemen in the employ of the telephone company, building through this country, went out on a strike last Tuesday. As is always the case in a big strike they had a great grievance, and while there is no walking delegates to come around and order them out they just walked out and refused to return until the company either washed the pillow-



cases or provide new ones. Who wouldn't strike? What are high wages compared to a dirty pillow? What is an eight hour day, compared with the thoughts of having to lay your tired head on goose hair at night that is encased in a slip reeking with filth. Hold out boys, stand up for your rights and don't work another lick until your wrongs are right.—*Harrisonville (Mo.) Democrat.*

The Western Wisconsin Telephone Company will soon extend their line from Elk Creek up Chimney Rock as far as P. J. Skogstad place. They will likely put on about a dozen instruments.—*Independent (Wis.) Wave.*

The Plymouth Telephone Company gave the Plymouth central girl, Miss Hattie Reed, a Christmas present of a purse of money. We think we have the best central girl there is.—*Plymouth Pickups in Emporia (Kan.) Gazette.*

There are seventeen rural telephone lines running into Overbrook and the Overbrook *Citizen* says that's "more'n" any other town in Osage county has got, all of which we guess is about true. —*Burlington (Kan.) Enterprise.*

The telephone girls of the Home exchange were nicely remembered with Christmas presents, Saturday. The girls were treated to candies, fruit, flowers and everything that suits the feminine taste.—*Portsmouth (Ohio) Times.*

John Veach is now a stockholder of the Mutual Telephone Company, so whenever you have cattle, hogs or corn to sell, just ring John up. He is a good buyer and a hustler.—*Pleasant Valley Pickings in Harlan (Iowa) American.*

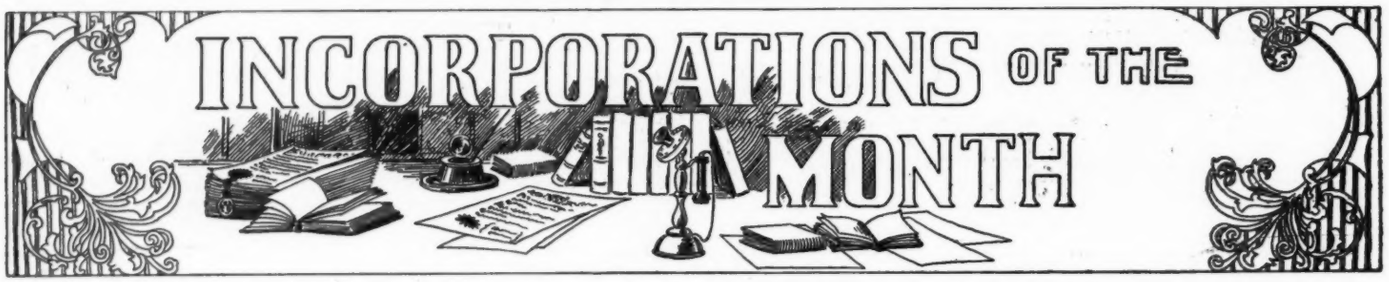
The new town of Everest will soon have a toll station on the Knoxville electric telephone line and will soon put on all up-to-date city airs. Manager Powers think there is nothing too good for the new town.—*Bussey (Iowa) Press.*

The Madelia Telephone Company has completed their line to Butternut, and the farmers along it are making her whirr with rings and calls all day long. Better test it while new.—*Butternut Valley Bits in Lake Crystal (Minn.) Union.*

Quite a lot of work has been done on the telephone system here. We hope to have the best service in the community and put the old saying "'Tis the fault of the Hunnewell line" in the shade. —*Hunnewell Letter in Shelbina (Mo.) Democrat.*

Another Clifton young man, by simply taking one Swallow has become a benedict. Glen Luse of the Home Telephone Co. was married during the holidays to a Miss Swallow of Springfield.—*Clifton Cullings in Springfield (Ohio) Democrat.*

There are two more new telephone companies formed. Rochester 53 and Jack Oak 52. We got our telephones in Tuesday evening and then everybody talked. People that had not visited with each other for months, visited over the telephone. They will be much enjoyed by all.—*Jack Oak Jottings in Oskaloosa (Iowa) Globe.*



ARKANSAS.

LENA—The Howardsville Telephone Company. Capital stock, $2,500. Incorporators, Edward Fisher, George W. Davis, F. A. Howard.

WALDRON—Waldron Telephone Company. Capital stock, $2,000. President, C. E. Forester; vice-president, J. E. Frisby; secretary and treasurer, J. O. Johnston.

DISTRICT OF COLUMBIA.

WASHINGTON—The Telegraph and Telephone Auxiliaries Company. Capital stock, $300,000. Incorporators, F. R. Austin and others.

ILLINOIS.

PETERSBURG—The Petersburg Telephone Company. Capital stock, $20,000. Incorporators, John S. Hurle, R. A. Kelly, Richard Waldridge.

CHICAGO—The Guarantee Telephone & Equipment Company. Capital stock, $2,500. Incorporators, L. Anderson, Albert Duce, Donald E. Turner.

TOWER HILL—The South Tower Hill Mutual Telephone Company. Capital stock, $1,500. Incorporators, John W. Jones, S. S. Herten, Chas. J. Simmons.

INDIANA.

AURORA—The Farmers' Co-operative Telephone Company. Capital stock, $1,000.

WICKLIFFE—The Crawford County Telephone Company. Capital stock, $2,000. President, J. T. Zimmerman; secretary, G. W. Fisk.

BUCK CREEK—The Beech Grove Farmers' Telephone Company. Capital stock, $500. Incorporators, Geo. W. Cinders, G. E. Smith.

EDWARDS—Otter Creek Telephone Company. Capital stock, $12,000. ncorporators, W. T. Carty, G. L. Stebenson, S. D. Humphrey.

INDIAN TERRITORY.

SOUTH MCALESTER—The South McAlester-Eufaula Telephone Company has been reorganized and the following officers elected: President, William Busby; vice-president, C. E. Foley; treasurer, D. M. Haley; secretary, L. Roberts.

IOWA.

CORWITH—The Rural Telephone Company. Capital stock, 10,000.

ROCKWELL—The Rockwell Telephone Company. Capital stock, $25,000.

BRITT—The Flat Telephone Company. Capital stock, $1,200. Incorporators, B. C. Way and others.

FORT DODGE—The Independent Telephone Construction Company Capital stock, $5,000. Incorporators, J. K. Alline and others.

ST. CHARLES—The St. Charles and Truro Telephone Company. Capital stock, $800. Incorporators, J. D. Clayton and others.

LETTS—The Muscatine and Louisa County Telephone Company. Capital stock, $600. Incorporators, Daniel O'Brien and others.

FIELDON—Western Telephone Company. Capital stock, $960. Incorporators, Frank F. Loellke; Francis A. Marks, A. W. Pinkelmann.

CHARITON—Richard E. Pedigo Company. Capital stock, $10,000. President, J. A. Penick; secretary, R. E. Pedigo; treasurer, W. E. Ashby.

NASHVILLE—The Nashville Mutual Rural Telephone Company has been formed with the following officers: President, J. J. Randall; treasurer, Samuel T. McKelvey; secretary, Christ Buhrmeister.

KANSAS.

STOCKTON—The Stockton and Sugar Leaf Telephone Company.

LARNED—The Ash Valley Telephone Company has been formed at this place, with a capital stock of $2,000.

KENTUCKY.

PRESTONBURG—The Prestonburg & Hindman Telephone Company. Capital stock, $2,400. Incorporators, B. M. Craft, J. C. Sutton, B. M. Spurlock.

MAINE.

CHESTERHILL—The Chesterhill-Elliott Telephone Company. Capital stock, $3,000. Incorporators, Hiram Hart, Augustus Strode, Arthur Patterson, W. A. Thomas, R. Q. Mendenhall.

MICHIGAN.

UNADILLA—The Unadilla Telephone Company. Capital stock, $9,975.

CASSOPOLIS—The Home Telephone Company. Capital stock, $25,000.

ROSCOMMON—The Roscommon Telephone Company. Capital stock, $1,000.

THREE RIVERS—Three Rivers Telephone Company. Capital stock, $35,000.

MINNESOTA.

THREE RIVERS—The Three Rivers Telephone Company. Capital stock, $35,000.

BALATON—The Balaton Telephone Company has been organized with James Murrison, president; Urbane Wilhelm, secretary.

READING—Farmers' Mutual Telephone Company. Capital stock, $25,000. It is the purpose of the company to build a system to cover the county.

RED WING—The Red Wing Telephone Company. Capital stock, $150,000. E. H. Moulton of Minneapolis and eight Red Wing people are interested.

MISSISSIPPI.

MONTPELIER—The Clay County Telephone Company. Capital stock, $1,000.

MISSOURI.

OXFORD—The Oxford Mutual Telephone Company. Capital stock, $3,000.

CHILLICOTHE—Articles of incorporation have been asked for by the People's Telephone Company, which will control the Chillicothe exchange. Capital stock, $40,000.

STRAFFORD—Farmers living in this vicinity have organized a telephone company with the following officers: President, W. A. Wood; vice-president, Nathan McGinty; secretary and treasurer, W. A. McGinty; trustees, J.R. Gillespie, M. C. Vinton and Solon Gillespie.

NEBRASKA.

WILSONVILLE—Interstate Telephone Company. Capital stock, $50,000.

OXFORD—Oxford Home Telephone Company. Capital stock, $50,000. Incorporators, J. F. Butterfield, W. H. Cowgill, F. H. Wheeler.

HARVARD—The Harvard Telephone Company. Capital stock, $40,000; paid up, $5,000. Incorporators, T. H. Walters, S. J. Rice, and others.

BELLWOOD—The Bellwood Telephone Company. Capital stock, $7,500. Incorporators, A. A. Jones, J. P. Meinyer, C. Meister and W. H. Grant.

RIVERTON.—The Rock Creek Telephone Company. Capital stock, $1,000. Incorporators, J. H. Bush, George Pimery, G. A. Kugler, A. T. Ready, M. Sullivan, R. D. Ready.

NEW YORK.

NEW YORK—The Schaper Construction Material Company. Capital stock, $25,000. Directors, John H. Schaper, George Schaper, Brooklyn; August R. Ermisch, Long Island City.

BROOKLYN—The Brooklyn Telegraph and Messenger Company. Capital stock, $100,000. Directors, M. K. Macdonald, A. C. Grinnell, E. W. Hunt, L. Macdonald, T. Leinard, A. F. Kelly.

SOUTH KORTWRIGHT—The Rose Telephone Company. Capital stock, $15,000. Incorporators, Hugh K. Rose and Mary J. Rose, South Kortwright; C. E. Hanford and Emily A. Hanford, Hobart.

OHIO.

WEST JEFFERSON—The Farmers' Telephone Company. Capital stock, $10,000.

RUSHVILLE—The Rushville Telephone Company. Capital stock, $5,000. Incorporators, B. A. Thomas and others.

ROME—The Rome Telephone Company. Capital stock, $5,000. Incorporators, S. R. Reeve, A. G. Reynolds, W. C. Stultz, I. N. Chopin, W. G. Miller.

BREMEN—The Bremen Telephone Company. Capital stock, $5,000. Incorporators, H. M. Shellhamer, A. F. Turner, S. E. Shull, J. C. Shaw, G. E. Turner.

HUNTSVILLE—The Huntsville Telephone Company. Capital. $5,000. Incorporators, O. P. Scott, W. O. Downing, M. K. Covington, G. M. Reagle, T. P. Sylvester.

MAUMEE—The Northern Ohio Telephone Company. Capital stock, $100,000. Incorporators, Grafton B. Moneu, Henry N. Perrin, David C. Creps, John M. Ormond.

VAN WERT—The Farm & City Telephone Company. Capital stock, $20,000. Incorporators, F. W. Purmont, John A. Wilmore, J. W. Miller, David Counseller, Hugh E. Allen.

OKLAHOMA.

GRANDVIEW—The Head Telephone Company. Capital stock, $20,000. Incorporators, T. E. Pittman, W. B. Head, R. E. Pitts, Theodore T. Sturges and T. F. Mastin.

CHEROKEE—Cherokee Rural Telephone Company. Capital stock, $12,000. Incorporators, C. Bradley, Geo. H. Coulson, A. D. Small, J. W. Howard, M. S. Clemmons.

APACHE—A company has been organized with O. W. Rogers, president; Arthur Dyer, secretary; M. Hester, treasurer, to build a telephone line from Apache to Anadarko, O. T.

OREGON.

OREGON CITY—Farmers' Telephone Company. Capital stock, $5,000. Incorporators, Frank R. Andrews, Fred J. Meyer, Linn E. Jones.

SOUTH CAROLINA.

GAFFNEY—The Cherokee Telephone Company has been organized with the following officers: President, T. G. McCraw; vice-president, J. V. Whelchel; secretary, J. E. Jeffers.

TEXAS.

BURKEVILLE—The Burkeville Telephone Company. Capital stock, $3,000. Incorporators, E. F. Montgomery, C. E. Cade, J. C. Ramsey and others.

PARIS—The Paris Telephone Company. Capital stock, $25,000. Incorporators, John B. Thomason, C. P. Hudson, George H. Trevathan, A. L. E. Morton, F. N. Fisher, J. G. Warren, C. D. McGreer.

WASHINGTON.

HARTLINE—The Ridge Farmers' Telephone Company. Capital stock, $10,000.

NORTH YAKIMA—The Ahtanum Telephone Company. Capital stock, $750. Trustees, James J. Wiley, H. L. Bergeron, S P. Vivian, Andrew Chambers and Ernest Woodcock.

WEST VIRGINIA.

ROWLESBURG—Rowlesburg Telephone Company. Capital stock, $10,000. Incorporators, W. F. Shoch, J. E. Wootring, A. J. Moone, George Hayes and associates.

HARDY—The Hardy Mutual Telephone Company. Capital stock, $5,000. Incorporators, J. H. Park, A. D. Walker, R. J. Wilkins, and J. W. F. Combs of Needmore; B. E. Brill, Fabins.

GRANTSVILLE—The Little Kanawha Telephone Company. Capital stock, $10,000.

PLINY—The Pliny, Veranda, Leon and Mt. Pleasant Telephone Company. Capital stock, $21,000. Incorporators, T. L. Finney, W. M. Dunn, C. C. Walker, F. A. Kearns and associates.

JUNTA.—Summers & Mercer Mutual Telephone Company. Capital stock $11,000. Incorporators, Chas. A. Baker, Wm. A. Smith, J. Welson Smith of Junta; Henry Dillon, Indian Mills; George W. Harmon, Crumps Bottom.

SPENCER—The Spencer and Uler Telephone Company. Capital stock, $5,000. Incorporators, W. S. Simmons, Roxalana, W. Va.; P. A. Tallman, E. P. Chewning, Aldersin M. Glothlin, C. A. Snodgrass and associates of Tariff, W. Va.

WISCONSIN.

WEST BEND—C. H. Dietz has filed articles of incorporation of the Washington County Telephone Association. President, C. H. Dietz; vice-president, W. Westcott; secretary and treasurer, J. J. Leins.

ANNUAL MEETINGS.

ARKANSAS.

EVENING SHADE—At a meeting of the stockholders of the Sharp County Telephone Company the following officers were elected: President, Sam H. Davidson; vice-president, S. P. Turner; secretary, C. J. Wilson; treasurer, W. B. Hamm.

MULBERRY—The Co-operative Telephone Company has elected officers as follows: President, Allen Troxel; vice-president, A. M. Yundt; manager, F. M. Gable; treasurer, J. M. Sims; directors, George Erdel, John Shepherdson, F. M. Butler, Randolph Goldsberry, Joseph Clapper.

CANADA.

RAINY RIVER, ONT.—The International Telephone Company of Rainy River has elected the following officers: President, D. Robertson; vice-president, E. J. Boucher; directors, Percy Roberts, J. A. Mathieu, H. J. F. Sissons.

ILLINOIS.

JERSEYVILLE—The Calhoun County Telephone Company has elected officers as follows: President, L. A. Delong; vice-president, W. A. Skeel; secretary, Charles H. Lamar; treasurer, Stephen McDonald.

Moro—The Moro telephone line No. 1, at its annual meeting, elected the following officers: President, Z. E. Bivans; vice-president, John Unterbrink; secretary, Smith Dorsey; treasurer, F. C. Zoelzer; director, W. D. Kuethe.

ROBERTS—The Lyman Telephone Company has elected the following officers for the coming year: President, Chris. Anderson; secretary, C. F. Brown; treasurer, P. B. Chambers; directors, Chris. Anderson, John Mosher, C. F. Brown.

SEYMOUR—The Seymour Telephone Company held its annual meeting at this place and elected officers as follows: President, William Osborn; secretary, J. M. Mullin; directors, A. S. Scott, Charles Wigton, J. S. Knox, A. Temple, A. J. Seymour.

ROANOKE—The directors, officers and manager of the Roanoke Mutual Telephone Company recently held their annual meeting in this place. Some new devices will be purchased by the company, and some improvements are also anticipated. E. M. Wheelwright was retained as manager.

BONDVILLE—The stockholders of the Bondville Telephone Company have elected the following officers for the ensuing year: President, W. H. Scott; vice-president, Peter Keller; secretary, O. W. Norton; treasurer, C. A. Crawford; directors, M. C. Busey, Chris Blank, Jacob Dawley, Perry Jacobs and John Pfiester.

GALESBURG—At its annual meeting the Galesburg Union Telephone Company elected the following directors for the ensuing year: G. B. Churchill, H. M. Chase, Dr. L. Peterson, LaFayette Weinberg, I. S. Callender, W. E. Terry, W. E. Phillips, G. L. Price, N. M. Burgland, E. P. Robson, Wataga; B. F. Arnold.

ALBION—At the annual meeting of the Edwards County Telephone Company the company was reorganized and the following officers and directors elected for the ensuing year: President, Charles Clark; treasurer, Moses Gumbrell; secretary, O. A. Bunting; William Reid, Tom Mitchell, Philip King, Dr. McDonald, Dr. Weber.

INDIANA.

FAIRMOUNT—The stockholders of the Citizens' Telephone Company has elected the following directors for the coming year: George Felton, John Himlick, John Simons, Oliver Buller, Ancil Winslow, Aaron Newby, Elias Wright.

BICKNELL—The stockholders of the Bicknell Telephone Company at their regular annual meeting re-elected the following officers for the ensuing year: President, J. H. Barr; vice-president, W. D. Lemon; secretary and treasurer, J. S. Hoover.

BLUFFTON—At a meeting of the stockholders of the United Telephone Company held at this place the following old officers were re-elected for the coming year: President, Hugh Dougherty; vice-president, W. B. Cooley, Hartford City; treasurer, L. C. Davenport; secretary, C. H. Plessinger; general manager, J. W. Sale.

MILLERSBURG—The Clinton Township Telephone Company, with exchange located at this place, has elected the following officers for the coming year: President, Charles R. Meyers; secretary, Edward Bartholomew; treasurer, Charles E. Freeland; directors, Jno. Scrannage, Robert Davenport, Ira Hapner and John Brown.

IOWA.

GRINNELL—At the annual meeting of the stockholders of the Interior Telephone Company the following officers were elected: President, E. A. March; secretary, Professor W. S. Hendrixson.

BOONE—The Farmers' Co-operative Telephone Company has elected the following officers for the ensuing year: President, S. M. Gift; vice-president, M. G. Jacobson; secretary, R. W. Engstrom; treasurer, Arthur Wills.

BOONE—The Dodge-Harrison Telephone Company, operating

north of this place, recently elected the following officers for the coming year: President, Fred Hein; secretary, Maurice Garvey; treasurer, Adam Moeller.

LE MARS—The Le Mars Telephone Company held its second annual meeting and elected the following officers: President, A. C. Colledge; vice-president, F. A. Post; secretary and treasurer, I. S. Mahin; general counsel, J. H. Sammis.

COIN—The annual meeting of the stockholders of the Coin-Northboro Telephone Company was held recently and the following officers were elected: President, J. R. Harris, Northboro; vice-president, Chas. Hart, Coin; secretary and treasurer, P. A. C. Jonasson, Northboro.

BARNUM—The Barnum Telephone Company has elected the following directors for the ensuing year: J. W. Hagans, P. T. Burke, M. D. Gurnett, C. F. Bryant, J. H. Eastman.

MARION—The Linn County Telephone Company has elected the following officers: President, D. E. Voris; vice-president, G. F. Finch; secretary and manager, E. C. Hampton; treasurer, George W. Toms.

WELTON—The Welton Mutual Telephone Company at its annual meeting elected the following officers: President, Herbie Buck; vice-president, Andrew Gregoire; secretary, Lewis Loofboro; treasurer, M. C. Mudge.

YORKTOWN—The Consolidated Telephone Company, at its annual meeting elected the following officers for the ensuing year: President, J. F. Meier; secretary, Wm. Chaffin; treasurer, M. List.

BLOOMFIELD.—The Citizens' Mutual Telephone Company has elected the following officers for the coming year: President, C. C. McAvoy; vice-president, L. F. Christy; secretary, Prof. C. D. Evans; treasurer, Geo. Phillips.

REDDING—The Merchants' Mutual Telephone Company has elected the following officers: President, Floyd Main; vice-president, George Adair; treasurer, W. G. Schancke; secretary, T. C Galloway; director, N. R. Miller.

GLASFORD.—The Glasford & Harker's Corners Telephone Company at its annual meeting elected the following officers: President, Charles Scarcliffe; vice-president, G. F. Black; secretary, George Scarcliffe; treasurer, O. Coultrie.

PARIS—The Wabash Valley Telephone Company has elected the following officers for the ensuing year: President, George W. Fair; vice-president, George W. Hughes; secretary, Dr. L. O. Jenkins; treasurer, James E. Parrish.

WASHINGTON—The Nira-Wellman Telephone Company has elected the following officers for the ensuing year: President, George Longwell; vice-president, Walter Furnam; secretary and treasurer, J. B. Hanley; director, Irwin Robinson.

SLOAN—The Lawton Telephone Company has elected the following officers for the coming year: President, G. V. Walker; vice-president, J. H. Abernathy; secretary, Dr. C. M. Wray; directors, O. A. Boggs, G. B. Seimer, G. A. Gilbert.

COUNCIL BLUFFS—The Independent Telephone Company at its first annual meeting elected the following directors: E. H. Lougee, F. H. Davis, E. H. Merriam, Leonard Everett, F. H. Keys, C. A. Beno, R. H. Bloomer, T. J. Shugart, F. J. Day.

CEDAR—At the annual meeting of the Union Telephone Company the following officers were elected: President, M. H. Picken. Cedar; vice-president, Wm. Abegg, Kirkville; secretary, R. J. Woody, Cedar; treasurer, R. W. Moore, Cedar.

MINBURN—At its regular annual meeting the Mutual Telephone Company elected officers as follows: President, H. K. Boyd; vice-president, Milt Beaver; sec., C. E. Bassart; treas., A. F. McQuie; directors, T. M. Hill, B. W. Glyde, Angola Smith.

ALBION—The Farmers' Mutual Telephone Company has elected the following officers for the ensuing year: President, A. C. Diller; vice-president, W. T. Gough; secretary and treasurer, P. L. Collins; directors, A. L. Cotton, H. A. Cole, William Holroyd.

VINTON—The Farmers' Mutual Telephone Company has elected the following officers for the coming year: President, J. B. F. Bunten; vice-president, P. A. Harper; secretary, J. M. Beatty; treasurer, John Lorena; manager and collector, Geo. N. Urice.

PILOT MOUND—The Farmers' Mutual Telephone Company at its annual meeting elected the following officers and directors: President, William Larson; vice-president and assistant secretary, D. C. Wiley; secretary, O. W. Cline; George Owen, E. E. Cartwright.

KANSAS.

KINCAID—The Eastern Kansas Telephone Company held its annual meeting on the 10th inst. and elected the following officers: President, J. W. Garrison; vice-president, A. P. Caldwell; secretary and general manager, R. L. Fraser; treasurer, J. M. McCaslin; directors, J. W. Garrison, Mont Van Buskirk, J. M. McCaslin, S. S. Irwin, Wm. Stanton, A. P. Caldwell, P. H. Yelton, S. N. Ewing, Geo. I. Curry.

KENTUCKY.

MT. STERLING—At a meeting of the stockholders of the Eastern Kentucky Telephone & Telegraph Company the following officers were elected: President, Dr. J. A. Shirley; first vice-president, E. T. Beis; second vice-president, Thomas Kennedy; secretary and treasurer, Henry Watson.

MISSOURI.

ROCKPORT—The Mutual Telephone Company has elected the following board of managers: Dr. A. McMichael, Dr. W. R. Strickland, Dr. J. H. Hedgpeth, H. F. Stapel and W. B. Christian.

NEBRASKA.

LINCOLN—The Lincoln Telephone Company has elected the following officers: President, C. J. Bills; vice-president, A. W. Field; secretary, F. H. Woods; treasurer, A. C. Faulkner. Directors, Simon Mayer, A. C. Ricketts, George J. Woods, John T. Dorgan, Mark Woods.

NEW JERSEY.

PATERSON—The Paterson, Passaic & Suburban Telephone Company has elected the following officers for the ensuing year: President, Chas. W. Kline; vice-president, Geo. A. Post; secretary, James W. Lindsay; treasurer, Barker Gummere, Jr.

OHIO.

PORTSMOUTH—The Portsmouth Telephone Company has elected the following officers: President, H. S. Grimes; vice-president, J. S. McKell; secretary and general manager, E. E. Knox; treasurer, A. H. Bannon.

MARIETTA—The Caldwell & Marietta Telephone Company has elected the following officers and directors: President, Andrew L. Gracey; vice-president, W. H. H. Jett; manager and treasurer, R. O. Wooster; secretary, R. O. Wooster; John Kaiser, A. C. Davis, C. B. Barry, W. H Bowron.

PENNSYLVANIA.

WESTFORD—The Westford Independent Telephone Company at its annual meeting elected the following officers and directors for the ensuing year: President, W. S. McConahey; vice-president, J. E. Coline; secretary, H. D. Bennett; treasurer, G. H. Hurlbert; manager, Geo. F. Martin. T. C. White, Geo. F. Martin, R. Fleming Blair.

CLEARFIELD—The Hunting-Clearfield Telephone Company has elected the following officers: President, W. D. Orvis; vice-president, A. W. Lee; secretary and treasurer, G. H. Lichenthaler; general manager, W. L. Halin.

RURAL VALLEY—The Cowanshannock Telephone Company has elected the following officers: President, Dr. A. J. Kelly, Whitesbury; vice-preisdent, W. T. Burns, Brainerds; secretary and treasurer, O. S. Marshall, Rural Valley.

CLEARFIELD—The Huntington and Clearfield Telephone Company has elected the following officers: President, Ellis L. Orvis, Bellefonte; vice-president, A. W. Lee, Clearfield; secretary and treasurer, G. H. Lichenthaler, Phillipsburg; general manager, W. L. Halin, Clearfield; directors, James Kerr, A. E. Patton, W. F. Barnard, F. G. Harris, Allison O. Smith, Rembrandt Peals, Thomas J. Lee, W. H. Denlinger.

HUGHESVILLE—The Muncy Creek Telephone Company has elected the following officers: Dr. T. W. Raper, Lairdsville, president; W. S. Opp, Opp, secretary; P. W. Opp, Opp, treasurer. The work of construction of this line will be started at once.

SOUTH CAROLINA.

COLUMBIA—The Columbia Telephone Company has elected the following directors: H. C. Young, Dr. S. S. Mann, Charles E. Taylor, H. M. Hall, C. E. Lenig, S. W. Hinkle, C. S. Oberlin.

TENNESSEE.

WEAKLY—The stockholders of the Weakly Telephone Company have elected the following officers: President, Hon. G. E. Bowden; vice-president, T. H. Farmer; secretary, R. W. Martin; directors, T. H. Farmer, J. M. Gardener, F. J. Burchard, R. W. Martin, Dr. D. W. Scotis.

VIRGINIA.

FREDERICKSBURG—At the annual meeting of the stockholders of the Orange Telephone Company the following officers were elected: President, Hon. George S. Shackelford; vice-president, Col. G. C. Taliaferro; general manager, Dr. W. F. Crittenden; secretary and treasurer, Capt. W. F. Coates.

WISCONSIN.

HUDSON—The Hudson Prairie Telephone Company has elected the following directors: Hon. E. W. Helms, W. E. Webster, Geo. Turner, C. E. Holden, John Hodgins.

WALWORTH—The Walworth Telephone Exchange Company has elected officers as follows for the coming year: President, H. S. Bell; vice-president, W. D. Church; secretary and treasurer, E. M. Holston; general manager, H. E. Walters.